PT7
The other terminal for IBM and ICL mainframes
FERRANTI

Digico's answer to US-built megaminis

MOVING up market, Digico has announced its answer to the US-built megaminis. Called the MTS16E, the Digico processor can be supplied with up to 2 Mbytes of main memory and can handle a multi-terminal system with up to 32 users.

The MTS16E is upwards compatible with existing Digico minis, including the Micro 16E introduced last year (CW, September 30, 1976), which Digico has renamed the M16E.

But the MTS16E incorporates several power boosting hardware differences.

Most important is a hardware memory mapping unit which can provide each terminal user with up to 64K bytes of main core and can switch memory stacks between users in four microseconds. This is part of a three-tier memory management operation involving system, user and terminal slots. Common subroutines and communications protocols are nested in the user slot.

Digico points out that the memory allocation and scheduling system is supported by its standard multi-programming system and is transparent to the user.

Other MTS16E features include additional instructions to handle up to 16 levels of vectored interrupt and a 10 slot multi-programming executive. Interactive multi-terminal extended Basic is offered for applications programming, and can be used more effectively than with other Digico machines. The MTS16E also comes with high speed floating point hardware.

MTS16E system prices range from £20,000 to £100,000, and Digico quotes £660 for each 32K bytes of RAM. Disc storage can be expanded up to 270 Megabytes, and Digico can supply customers with its own Regent display terminal.

The first MTS16E customer is Loughborough University, which is paying about £20,000 for a four-terminal configuration with a 192K byte main memory and 11.2 Megabytes on disc. It will be used in the Department of Library Information Studies.

One of the latest companies to install a Digico M16E-based system for commercial data processing is Continental Wine Experts of Norfolk, which manufacture wine-making kits.

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NEWS IN BRIEF

Redifon's 56% rise

KEY-TO-DISC manufacturer Redifon Computers has announced a turnover of £11 million for its 1976-77 financial year which ended on March 31. This is 56 per cent higher than in 1975-76. About 45 per cent came from sales in Eastern Europe where Redifon's strongest markets are Poland and Czechoslovakia (CW, June 9). Pre-tax profits, at £1,706,000, were 28 per cent up on the previous year.

Sit-in ends

SIT-IN at Plessey's Kirkby, Liverpool, factory has ended following a mass meeting decision last week. A total of 136 people were involved, demanding better redundancy terms, and about 60 of these have shown an interest in vacancies at the company's Edge Lane and Huyton plants.

Prices down

PRICES of Digital Equipment LA-36 DECwriter keyboard/printers sold by Data Dynamics have been reduced to £1,005 for single units and £995 for quantities of 50.

Giro contract

A CONTRACT worth £1.5 million for the supply of personalised stationery to Giro account holders has been won by Rochford-Thompson of Newbury, Berkshire.

Range extended

EXTENDING its Reality range of file management systems up and down, CMC has introduced the Reality-5 for low volume applications and first time users, and the Reality-50 which can be supplied with up to 200 Megabytes of disc storage.

Decision tables draft 'inadequate'

By Stephen Bell

A STANDARDS document on decision tables, published by the British Standards Institution last week, is likely to attract heavy criticism.

Several points of the standard were criticised by decision table experts when it was still in its draft version. Publication of the final version shows that many of the criticised points remain unaltered, or have simply been evaded.

These shortcomings are particularly worrying, the critics contend, since the BSI document is intended as the basis for a projected international standard.

Decision tables are an increasingly widely adopted and convenient method of expressing the logical connection between the replies to a number of questions and the actions to be performed as a consequence of the replies.

While decision tables have been used manually, they have proved particularly appropriate as an expression of the decisions to be taken in a computer program.

The most serious shortcoming in the BSI document, say observers, is a failure to account for unexpected conditions. For example, if a variable should have value A or B, then the table should also include the condition when the variable has neither of the expected values, and an error action should be specified.

This omission, it is claimed, means that the procedure given in the report for generating and checking the possible combinations of conditions becomes unworkable.

A number of procedural points have also been singled out as bad practice; for example, the ambiguous use of the dash. As a result of long practice, this symbol is recognised as meaning that the reply to a question is, in a certain case, immaterial. The BSI standard uses the dash in at least two other roles.

The chairman of the committee which formulated the standard contended that criticisms had been few and "have emerged at a rather late stage," when the draft could not easily be amended.

A possible shortcoming of BSI procedure, however, emerged in his comments. The BSI circulates its draft standards primarily to organisations, so they may not be seen by many individual experts in the field concerned.

The aim of the standard, he added, had been to keep it as general as possible, without "tying it down to a particular package or language."

NCC rule changes planned

AN extraordinary general meeting of members of the National Computing Centre is to be held within the next six months to discuss changes to the Centre's constitution which will increase member representation on the council.

The changes are needed because the NCC's annual grant has now been replaced by contracts for specific projects (CW, March 17). Given this increased government independence, the NCC now believes it is inappropriate to have the Department of Industry nominating half its council members.

The need for constitutional change was discussed last week by the NCC's chairman, Professor James Merriman, at the Centre's annual meeting.

Southwark goes for a 2970

ONE of the councils leaving the London Boroughs' Joint Computer Committee, Southwark, has ordered a 2970 from ICL. The machine will cost £800,000 a year, compared with the £500,000 which Southwark estimates it would have had to pay to stay in the consortium; but it says the bigger system will enable it to run many more systems of a non-financial nature.

The order redresses the balance towards ICL a little, as Bexley and Kensington and Chelsea have ordered IBM 370/138s.

The fourth borough in the consortium, Greenwich, hopes to co-operate with Westminster, using the city council's computers.

Southwark's 2970, with two M-bytes of memory and 800 M-bytes on disc, will be installed in an existing building in October next year. The joint computer centre, which runs a System 4, is due to close the following April.

Southwark will convert as many financial systems as possible from the System 4.

£60,000 grant

THE Council for Educational Technology is to receive a grant of £60,000 from the Department of Science and Education to provide a general information service on computer assisted learning. Roger Miles, assistant director of the National Development Programme in Computer Assisted Learning, which ends its five-year life in December, is expected to join the CET to run the new service.

CAP takes delivery of Series 1

DELIVERY of an IBM Series I to CAP UK's offices in Bloomsbury, London, last week emphasised the company's commitment to develop software for the machine (CW, May 26).

The configuration acquired by CAP has 64 Kbytes of memory, a combined disc-diskette unit, a matrix printer, teletype channels — the first example of an IBM-provided connection to a non-IBM device — a visual display terminal and a general-purpose I/O channel for attachment of unusual peripherals.

Most of the initial applications of the IBM minicomputer are expected to be in distributed processing. CAP expects that a large number of its clients, already using IBM mainframes, will be encouraged by the Series I launch and the general trend to distributed processing to look seriously at the machine. This would provide CAP with a large potential market.

Dr Gill Ringland, project manager for CAP's Series 1 developments.

Initial Series I inquiries also show a requirement for unusual peripherals such as badge-readers and colour displays, for the use of non-DP-oriented staff. CAP maintains that it has sufficient experience with device handlers to offer good services in this direction.

CAP intends to produce a number of software products for the Series 1, including an implementation of its MicroCobol and a debugging system, also based on its MicroAde software for microprocessors.

CAP's project manager for Series I will be Dr Gill Ringland.

Cray Research financial results

FINANCIAL results for the second quarter of 1977 from supercomputer manufacturer Cray Research include turnover and net loss figures of $527,327 and $634,206, while the figures for the first half of the year were $1,036,301 and $1,121,776, respectively. Most of the turnover came from leased system rentals and Cray expects to install two more machines soon.

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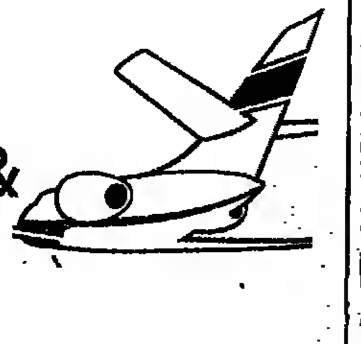

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ASCOM Computer Tape

IFIP 'revolutionaries' meet in Toronto

Report from Malcolm Peltu

THE skyways were empty, the band played Everything Is Coming Up Roses and there was a whiff of revolution in the Toronto air.

Despite a strike by Canadian air traffic controllers, over 2,000 delegates had registered by the time IFIP 77 got under way to the musical accompaniment of the band of the Royal Regiment of Canada. And the revolutionary talk came from speaker after speaker at the opening ceremony who stressed the same themes concerning the impact of information technology as were expressed at the ACM/Computer Weekly conference (CW, July 14).

The Canadian Minister for Science and Technology, J. Hugh Faulkner, for example, spoke of the "irreversible changes that will be caused by the information technology-based revolution".

The keynote speaker, chairman of the Science Council of Canada, Dr Josef Kates, told the delegates that "you are the revolutionaries who will irrevocably transform today's society and who must communicate to others not only the technical but also the social, economic, and even the philosophical implications of your discoveries.

"The technological revolution that we face is proceeding so quickly and affects every aspect of our lives so deeply that those of us who count ourselves among the priesthood bear a tremendous responsibility to ensure that our society is capable of integrating the changes that we know are coming."

While Dr Dick Tanaka, president of IFIP, suggested that IFIP itself was perhaps reacting too slowly to the growing rate of change in the computer-based society.

"And if IFIP, which has been in the forefront of looking at these problems, is falling behind, what about the rest of the

●Turn to page 4

Briefing

France boosts IC production

THE French government is to spend 120 million francs, £14.5 million, a year over the next five years to build up integrated circuit production. The annual figure will be indexed for inflation, and is double what the government has so far spent each year in support of the integrated circuit industry.

A commission has been set up to put the support plan into action, and it is due to report by the end of November on how the money should be shared out.

ICL dispute

TALKS resume next week between ICL and unions in a bid to solve a dispute over a proposed self-financing productivity scheme (CW, August 4). This follows a threat of industrial action by members of APEX, EESA, ASTMS and ACTSS.

Natwest's 3033s

THE National Westminster Bank is to install IBM 3033s at its new London computer centre as replacements for old 360s. The bank would not say how its needs would be met but it is now in negotiation with IBM.

● The 3033 draw, back page.

Philips chuffed

ORDERS worth over £1 million were won by Philips Data Systems during a 13-city promotional journey by train called "Datatrain". Delegates from over 1,500 businesses attended the demonstrations last month.

B3800 additions

CLOSELY following the two new low-cost B2800s, Burroughs has announced two additions to the B3800 line, the B3834 and the B3835. The first is available for immediate delivery in the US and the second in the first quarter of 1978; no further details are yet available.

Rapid results

THE EEC Council of Ministers has approved the European Space Agency's plan to connect research centres in the UK, France and Germany to CERN in Switzerland, by high-speed satellite data links. The plan will enable physicists in the three countries to get rapid results from experiments carried out at CERN, the Centre for European Research into Nucleonics.

Court action

A US court has been asked by EMI to stop a US firm, Pfizer Medical Systems, from using EMI inventions in the manufacture of computerised medical X-ray scanners. The suit is similar to one filed by EMI against another US firm, Ohio Nuclear. In both cases EMI says it is willing to make its patented inventions available under licence.

System X £20m contracts awarded

DEVELOPMENT contracts worth about £20 million have been awarded to GEC, Plessey and STC for the System X all-electronic telephone switching exchanges for the 1980s.

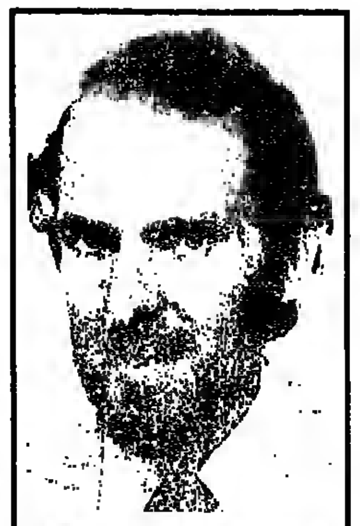
Formal confirmation of the contracts has yet to be announced, but it is understood that GEC's contract is for the computers to control the exchanges, which will be based on the GEC Mark IIBL processor.

Plessey's contract, for the switching systems, could prove the most valuable of the three, while STC will develop the communications and signalling equipment.

System X development contracts worth £50 million were scheduled to have been placed 18 months ago (CW, November 27, 1975), but were delayed as a result of the £306.6 million loss by the Post Office.

A plan for a joint company to be established by GEC, Plessey, STC and the Post Office to manufacture and market System X is being considered in the

● Turn to page 7



Winning post

GERIN GOWAN, a prizewinner in the recent computer security essay competition organised by Infotech and Computer Weekly, has joined Langton Information Systems as a senior consultant.

Gowan has eight years' experience of designing large database systems, planning online information systems and performance measurement and has been working on government database projects. This experience will be put to use at Langton, where he will help incorporate database techniques into structural design systems.

Gowan's essay won a special prize for originality in looking at security from a data item's viewpoint (CW, June 16).

Papermill blast ruins data prep department

THE data prep department was virtually destroyed and the rest of the computer installation put out of action when a central heating boiler blew up at the Bowater-Scott papermill at Gravesend, Kent, during the early hours of Tuesday.

The only staff on duty were two night shift operators, who escaped unhurt.

About 20 data prep girls work in the area where the floor collapsed.

The extent of damage to the main processor, an ICL 1902T, had not been assessed when Computer Weekly went to press, but all data files were intact. Bowater has a reciprocal agreement with another installation to cover for emergencies, and the company was confident that there would be little delay in DP operations.

APPALLING DECISION, SAYS MP

US minis picked for job centres

By Keith Jones

A PLAN for Employment Services Agency offices throughout the country to be equipped with US-built minicomputer equipment has been described by Labour MP Eric Moonman as "an appalling decision".

The ESA is buying Interdata minis and printers to speed the dissemination of vacancy details among job centres in major metropolitan areas, and Moonman has written to Employment Secretary Albert Booth, complaining that the ESA's choice of a foreign supplier is against what he describes as "the good interests and principles of the job creation scheme".

The Interdata kit was selected in preference to Digico minis and Dataco and Trend printers, all built in the UK.

Moonman has asked Albert Booth to intervene before the US-built equipment goes live.

Digico marketing manager Ken Atkinson said, "A contract of this sort in the US or West Germany would definitely have gone to a domestic firm."

Two systems have been ordered so far, one with 70 terminals for the London area and another with 30 for Glasgow.

Liverpool and Newcastle are the next two cities earmarked and the final total could be 12 systems worth about £1 million.

An Interdata spokesman told Computer Weekly that Interdata expects to be awarded contracts for all the systems.

The terminal systems are replacing telex and postal distribution job details. According to Digico, the application is one which it could easily have tackled, especially with its experience in terminal handling and front ending.

The ESA was advised to buy from Interdata rather than Digico by the Central Computer Agency, and Digico has written to CCA director Kray Atkinson, asking for an explanation.

The CCA told Computer Weekly that Digico may get a fuller explanation, but pointed out that its choice of foreign equipment comes within the government's multiple tendering policy.

Digico believes that the CCA may have favoured the quality of the print generated by the Interdata daisy wheel printers compared with the output on matrix units, but thinks that this is an unimportant consideration in an application where high print quality is not essential.

Moonman is particularly concerned about the loss of labour intensive printer manufacturing business to a US supplier at a time of serious unemployment.

The configuration bid by Digico for the London system included a Digico Micro 16E processor, with a 5.4 Megabyte disc store and modem interfaces, worth £40,000, 30 Dataco 6120 100 cps matrix printers worth £39,000 and 40 KSR Teletype units valued at £40,000.

The Glasgow configuration includes a £30,000 processor, 30 Trend 800 30 cps printer terminals valued at £40,500, and £22,000 worth of Modular Technology Minimodems.

According to the ESA, the Interdata system in London will be used until 1981, by which time the Capital job matching network, based on Honeywell's Acton data centre, will have been extended to cover all of Greater London (CW, June 23).

COMPUTER WEEKLY'S INSIDE NEWS

Risky business

Computer service companies are risky investment prospects. This is the gloomy news from a stockbroking firm which has produced a report on the industry for the City. And the report shows how the market has to be dominated by a few very large companies. Page 3

Bankers' answer

A few weeks ago Focus took a swipe at DP in the UK banking community. His criticisms have been taken up by Charles Read, director of the Inter-Bank Research Organisation, who points out that the picture is by no means as black as Focus seemed to think. Page 4

Take your pick

Buy, lease or hire . . . that's a question which deserves as serious consideration as the technical merits of different computers. A User Forum survey of mainframe manufacturers helps you choose. Page 11

Five-year plan

The ICL of the future is revealed in the company's five-year plan. And if all goes well the company will double its turnover by 1982, have processors which are 50 times faster than at present and discs with 20 times the present capacity. Roll on 1982. Page 32

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COMPUTERVIEW

Catalyst for agreement on national policy needs

GOVERNMENT policy on the computer industry should be seen as only one aspect of a much broader canvas which should include the effects of information technology on the social, economic and human facts of life.

And existing government policy, even to the computer sector itself, did not exhibit sufficient coherence and awareness of the dangers facing Britain economically, if the country does not gear itself for a new technological lifestyle.

That view was the result of many hours of discussions at Hedsor.

In talking about current government policies, Martin Lam, Under-Secretary at the Department of Industry, said that because there was no imposed order it did not mean that there was no order at all in government policy to the computer industry.

He described the various aspects of existing government policy, which includes bodies such as the Computers, Systems and Electronics Requirement Board, the Science Research Council, and Neddy computer sector working party.

He pinpointed the establishment of ICL, the National Computing Centre and the NEB's Inmac computer services company as milestones in government policy.

He also said that, while most people were calling for "a policy statement," few could agree on what that policy should be.

From the discussions at the conference, however, it became clear that, while there was disagreement on the details of a policy, there was a general consensus on the shape of the overall strategy.

This consensus found a focal point in an eight-point plan presented by consultant Ian Barron (CW, July 14).

The key elements in this plan were that: the policy should be based on a perception of the future, not the past; it should be oriented to the usa, not the manufacture of computers; it should be based on the convergence of computer, telecommunications and semiconductor technologies into a new "information technology"; the impact on social and educational policies must be considered; the future of the Post Office must be integrated into the plan; and the government must play a major role as a user of the technologies.

There was virtually no disagreement on the aspects of policy affecting the world outside the computer industry, and it was stressed over and over that it is futile to consider the computer industry in isolation from the uses of computers and their overlap with other technologies.

At times, delegates to the conference exhibited a despair at the difficulty of ever convincing "the outside world" of the importance of information technology. It was felt that few people in positions of power and influence in private and public organisations were even aware of the questions that had to be answered.

More positively, however, it was felt that, as telecommunications and microprocessors brought computer power closer to the everyday user, there would be a rapidly increasing public awareness of computers.

When it came to policy on the computer industry itself, however, there was far less unanimity of purpose, and sectional interests came to the fore, particularly in discussions on how any government money-cake should be cut.

So no conclusions were reached on the precise nature of government policy to the computer industry, except in the context of Barron's point about the emphasis that should be given to the use of computers.

And once again it was stressed that some coherent policy that related to wider issues should be provided.

The government procurement policy, which was reinforced last week by an announcement of the continuation of single tendering for large mainframes in central government, was felt by many delegates to fall between too many stools.

As shown by this week's decision by the Department of Employment to choose US manufactured equipment (front page) it often appears that the government's right hand does not know what its left hand is doing — and even tha fingers on the same hand seamed to be acting on their own initiative.

This project also highlights the reasons why a co-ordinated national policy was called for. Otherwise how can one answer questions such as: Should a government department aiming to assist employment, ensure that contracts it awards improve employment in Britain or should it be free to choose what it regards as the most cost-effective system.

And why should a central government organisation spending, say, about £1 million on a large mainframe, be subject to different policies from a department spending the same money on a multi-mini configuration?

Judging by the widespread response to Computer Weekly's call for action following the Hedsor conference, there are many within the computer industry with the foresight to see that these questions are more than just of parochial interest.

And, in retrospect, Hedsor is likely to be remembered as a catalyst which brought together the industry to agree that any national policy towards the computer industry should be based primarily on the needs of computer users, ie the whole of society, and not just on the blinkered needs of the suppliers.

Hedsor Workshop: 4

Government policy

Discussions at last month's ACM/Computer Weekly conference held at Hedsor Park revolved around one central theme: government policy towards the use and supply of information technology services.

This week, Computerview summarises the weekend discussions on how the government could act to help ensure that computers play a positive role in the country's economic and social life.

Ten years ago...

COMPUTER WEEKLY, AUGUST 10, 1967

THE Ministry of Technology planned to give extra support to the computer industry. Management information systems, process control, computer-aided design in architecture and engineering, databanks, teaching aids and aids to medical diagnosis and records were among the areas designated. A ministry memorandum warned that Britain might be lagging behind Continental countries in the rate at which computers were being installed, as well as modernity and effectiveness of installations ... A prototype of the Ferranti FM 1800B microintended for such applications as military aircraft and navy applications, was introduced ... According to a study published by International Data Corp in the US, the computer capacity of Europe's top 10 privately-owned companies grew by over 88% during the period 1962-66 ... A challenge to Elliott's range at process control machines was presented by English Electric's 1/4 system, still in the development stage. It consisted of a series of modular units designed to work through a standard interface ... Extending the top end of the H200 series, Honeywell introduced the 8200, a large multiprogramming system ... The first ICT 1907 was installed and operating at the company's Putney headquarters ... Hull GE's shares were reduced from 80 francs to 30 after a £5 million loss in 1966.

FOCUS

... from a distant shore, reflects on the dog days of summer.

NOTHING turns off the computer industry more than the summer break. It's almost total downtime for decisions during the holiday period. The calling of Club Mediterranee has very definite priority over the calling of software or printer-ribbon salesmen.

Several weeks before making tracks for Corfu, DPMs are more concerned with organising supplies of suntan lotion and snorkel masks than disc packs or shredders. The only shedding envisaged are inhibitions.

Meanwhile back at the installation, although all may not be joy, operations are in relaxed mode. No longer is tomorrow the target date. Deadlines are more probably next month. The company hierarchy themselves are no doubt occupying sundry villas across Europe and such activities as board meetings or computing policy discussions are not on the agenda.

User departments also make far fewer damands on the computing service. Company salesmen are not reporting back with overflowing order sheets. Very probably they are not reporting back at all, having already headed for the beaches.

For the programming team, life could also be peaceful. Just about the most exciting tasks on hand era long ignored job rewrites. With boundless machine testing time at their disposal, highly concentrated work is not the main worry.

Often the highlight of activity in the computer room is a major refurbishment. Equipment can be freed for comparatively lengthy periods. Servicemen do not have to contend with anxious ops managers who, an hour after work has started on a disc controller, demand how much longer tha operation will take.

No doubt all but the most zealous computer salesman and suppliers have got tha holiday message. If deals were not clinched by mid-June than that anticipated holiday commission will have to be earmarked for winter sports.

Any organisation that did not achieve a new launch in May will mark time until early September. Despatching postcards is more normal than sales proposals.

Likewise, the DP education service industry falls into line. No self-respecting concern would contemplate mounting conferences, seminars or workshops during the high summer season. Activities are limited to forward planning and booking of speakers and venues.

There are, of course some advantages from the long break. It presents an opportunity for stationery supplies to catch up with demand — providing the factory has not shut down.

The holiday period should also be a time for catching up with outstanding reading, and clearing desks and files ready for the autumn avalanche.

Everything may not stop for tea — but it very nearly does for the summer break.

But Focus has no summer break. Even now, as I am scheduling my resources at the Club Mediterranee ....

RAIR TERMINALS
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Service companies 'offer little security'

COMPUTER service companies offer little security to financial investment companies and will have to continue relying heavily on funds generated internally.

This point is made in a report on the services industry for the City by stockbrokers Greene and Co.

Lack of tangible assets has made service companies unattractive investment propositions, says the report. "The non-processing company has only its employees; the processing company need not own its equipment.

"Their only assets are their products, which might be short-lived, and their client base, which can soon disappear. Thus, while these might be very attractive to another computing service company (particularly a foreign-owned company) seeking to expand, they offer little security to a financial investment company."

Commenting on the findings Alan Benjamin, director-general of the Computing Services Association, said the investment situation was true of any service industry. He pointed out that investors would take equity as security as well as tangible assets.

"I am happy that the City is showing enough interest to generate a report," he said. "The industry must not mind if a few warts are exposed."

The report points out that computer services need more capital for more powerful processing facilities and packages. Relying on internally generated finance means that growth is slow.

Such growth makes for stability, says the report, but adds, "Difficulties begin where merger increases in computing facilities, major product development, expansion overseas, are desired or necessary and when the market turns down."

In these circumstances the independent company is vulnerable, while companies which are subsidiaries of larger groups have extra finance to call on.

This situation is reflected in a chart showing the 1976 turnover and profits of 50 service companies. At the top are the Post Office's National Data Processing Service; the National Coal Board subsidiary Compower; and ICL's subsidiary Dataskil.

The report says that the wide disparity in turnover between the top and bottom companies shows the domination of the market by a few very large organisations. At the top is the National Data Processing Service with £34.7 million, Compower with £10.5 million, and Dataskil with £8.2 million. The turnover of the bottom 13 companies ranges from £135,000 to £500,000.

Even allowing for the amount of business which tha top three get from their parent organisations they are still in the top 10.

The report gives a general background to the industry and several pages of charts showing companies' profit margins, capital employed, debtor control, turnover per employee and average salaries: the median here was found to be £4,242.

* Investment in Computer Services. 60 pp. £50. Greene and Co, Finsbury House, 22 Blomfield Street, London EC2.

Danes sell German operation to TRW

DENMARK'S only computer manufacturer, Regnecentralen, has split its West German subsidiary, Gier, in two, and sold the marketing operation and the name to TRW Datacom International.

Previously the West German distributor for both Regnecentralen and TRW products, Gier will now concentrate exclusively on the TRW portfolio of equipment, which includes the Datapoint line of distributed processing systems, OCR equipment from Computer Entry Systems, Centronics printers and transaction terminals made by TRW itself.

A new company, RC Computer, has been formed by Regnecentralen to market the RC 8000 small mainframe and RC 3600 line of terminal systems. The RC 8000 is a small 24-bit mainframe similar to the 2903 and 2904 of ICL. It can support several disc drives of up to 248 Megabytes each, and main memory extends from 32K to 384K-words. The RC 3600 is a multi-purpose intelligent terminal system built around the Data General Nova t200 mini.

RC Computer will also market the services of Regnecentralen's German bureau, which is based on the RC 8000 and the older RC 4000 computers.

TRW has been taking a financial interest in its distributors for some time and already has a 40% stake in both its French distributor Matra-Informatique, and its UK distributor Ventek. In each case it has the right to acquire the remaining shares later.

Regnecentralen will continue to market the TRW portfolio of products in Denmark, Norway, Netherlands, Austria and in several Eastern European countries.

Computer City at IBS

VISITORS to this year's International Business Show, to be held from October 11 to 20 at the National Exhibition Centre, Birmingham, will be able to walk around a Computer City — a walk-round display by courtesy of ICL (CW June 9, 1977).

ICL designed the display, which is based on circular units, and is sited in Hall 1 of the centre.

Each unit in Computer City contains equipment for a particular field and those covered include general office and accounts departments, manufacturing, retail and distribution industries, finance, and the newspaper and printing industries.

The emphasis will be on VDUs and direct data entry devices for unskilled users.

Continuing overseas interest is being taken in the Business Show which will feature companies such as ICL, IBM, Wang, Datasaab and Daro, the East German peripheral and email systems manufacturers.

Viewdata conference

A ONE-DAY conference on Viewdata, the Post Office's experimental information system, is to be held at the Mayfair Hotel in Berkeley Street, London on September 29.

Viewdata links the home television receiver via the domestic telephone to a potentially unlimited database of information. Any organisation can provide information and sell services via Viewdata, and the conference will feature speakers from the Post Office, potential users, information providers and GEC.

Speakers from the Post Office will include S. Fedida, the originator of Viewdata, and Roy Bright and Mike Smith from Post Office Telecommunications.

The conference will concentrate on the implications of Viewdata for business, and is being organised by Butler Cox and Partners in collaboration with the Post Office.

The charge is £86.40, and further information is available from Butler Cox and Partners. Telephone 01-353 1138.

£45m micro based plan to stop fare fiddlers

A computerised automatic ticket checking project valued at over £45 million has been put forward by London Transport for GLC approval. Work could begin within nine months of approval.

The system is likely to have microprocessor based ticket machines controlled by a central supervisory computer. No decision has yet been taken on the nature of this central system, which could be based either on a large central mainframe installation or on some form of distributed processing.

The supervisory system will monitor all equipment and give immediate warning of any fault as well as providing information on the pattern of travel.

The system will be compatible with a similar British Rail scheme which is to start experimental trials next year using Ferranti F100-L micros in the ticket issuing machines (CW, March 3, 1977).

London Transport estimates that it loses £6 million each year through fraudulent travel and it is claimed that the automated system will eliminate much of this.

For, with the new system, the automatic gates will be able to read from the ticket where the passenger has started the journey and whether the correct fare has been paid.

ICL strikes gold with 2900s

THE South African market has been more receptive for its size than other other to ICL's 32-bit 2900 machines, and the company has struck gold there once again.

The customer this time is the giant Goldfields of South Africa, part of the Consolidated Goldfields group, which has ordered a £1.7 million 2970 to replace its £1 million 1904S. This is the eighth 2970 ordered in South Africa so far.

Applications planned for the 2970 include financial modelling, operations research, metallurgical plant simulation, stress analysis and rock mechanics.

Although already an ICL user, the company says it looked at all the major manufacturers' equipment before settling for a 2970 and ICL won the contract because of price, software, engineering back-up and the likelihood of ICL remaining in the market.

Operations transfer by CMG

WITH less than a year to run on its existing contract with Burroughs, CMG is transferring all head office operations to its Croydon location, and is planning to replace its two Burroughs B4700s.

As well as the 4700s CMG runs a Honeywell H3200 and two Ht200s. Nearly £2.5 million of work is handled each year.

CMG has been talking to several manufacturers and now has a short list of Burroughs, Honeywell and Univac. The Burroughs contender comes from its 800 series, the Honeywell bid is the 6000 series while Univac is offering machines from the 1100 series.

A decision is expected by the end of the month.

The selected hardware will eventually take over the work currently being run on the two B4700s, and will be operated in a twin processor, shared peripheral configuration at Croydon.

The hardware changes will not effect CMG's subscription accounting and Invest portfolio management work.

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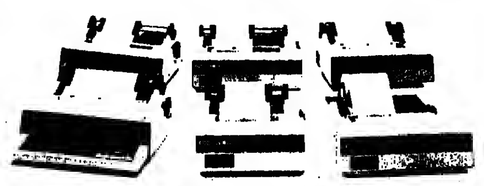

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DOWNTIME by Chad

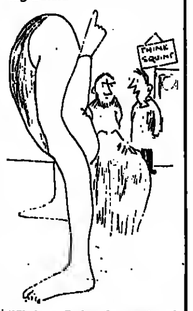
Which finger on the button?

THE first few IBM Series models to arrive in this country reveal a curiously non-ergonomic distribution of controls.

A prominent feature of IBM's 360s and 370s is a large "emergency pull" button on the console, which shuts down the whole machine instantly in the event of a catastrophe. On the Series 1, this button is not on the console, but at the very top of the machine, about six feet from the floor. It would be interesting to "benchmark" the delay caused by this placing and its possible consequences.

The on-off switch on the floppy disc unit appears to be intended for operation with the knee. If it is placed at the same height on all machines, Series 1 operators should soon be complaining regularly of backache.

Still, perhaps we are being unfair to IBM. The company is, after all, unused to designing tall thin computers. The machine is also modular, so possibly those we have seen simply had their blocks stacked up in the wrong order. If IBM does not improve this situation, I can see it being done surreptitiously by operators with screwdrivers during a night shift.



"She's a Series 1 operator, I think . . ."

Pork chop logic

EDINBURGH University scientists have come up with the perfect pig — a computer simulation which does everything but grunt. The development could revolutionise the pig farming industry, allowing nutrition research which normally takes a couple of years to be carried out in a matter of hours.

Dr Colin Whittemore, of Edinburgh University School of Agriculture, helped by a mathematical economist and a computer expert, built the computer to carry out animal production experiments without the aid of animals.

The system incorporates a complex series of equations representing the biochemical and physiological reactions of a pig to various diets, weather conditions, accommodation, and so on.

The electronic pig then churns out a day-by-day breakdown of the animal's growth rate under different sets of conditions. It can "grow" several months in seconds.

The researchers can tell whether a pig will be fat or lean, whether suitable for pork or bacon, and work out costs. The system will enable pig farmers to plan well in advance to produce pigs to order.

Real porkers, that is: only the Muppeteers can produce that epitome of porcine sophistication, Miss Piggy.

Brought to book

A FOOTNOTE to Computer Weekly's call for action to spread the gospel about computers among the gentiles: my Bristol scout reports the following from a local newspaper. I quote:

"When a suggestion was made today to investigate the use of a computer system into the Avon County Library Service, Councillor Don Rippon expressed the gravest doubts about whether society had gained very much from computers . . . He said he had lived with computers for the last ten years and called them a useful adaptation to a clerk with a pen. But whether they had improved on the chap with the pen was another matter, especially over accuracy in accounting.

"He warned his colleagues on the county's community leisure committee that while the computerised age was with us, if a computer were introduced into the library service it would not necessarily save money, for it would call for expensive equipment and highly skilled and specialised staff. The committee agreed to an investigation, provided this in itself did not cost too much."

I wonder if the Avon library service has an up-to-date book on the subject?

Univac scores at Ayr

VISITORS and journalists at the Open Golf Championship at Turnberry, Ayrshire, last month, were saved the drudgery of traipsing round the course to follow the stars' progress, thanks to Univac.

The company installed three DCT 500 terminals at the course. Results were telephoned to the central control room. They were input to a terminal there and transmitted to other terminals in the visitors' tent village and the Press centre. So journalists were able to write detailed reports for their sports pages without ever leaving the bar.

"ARE you in the elite 0.1 per cent who know how Dijkstra differs from Jackson?" asks a Honeywell announcement of a structured programming course. It seems that certain people within Honeywell aren't within the elite percentage who know how to spell Dijkstra. As most of the elite know, the real difference is that Dijkstra has a beard and Jackson hasn't. The super-elite are those who know how to spell Dijkstra's first name.

Banks' problems and successes

In his weekly column Focus takes a down-to-earth, and sometimes acerbic, DP manager's view of various aspects of the computer scene. When he wrote about banking systems (CW, July 17), his comments were not very favourable. Here Charles Read, director of the Inter-Bank Research Organisation, takes up cudgels on behalf of the banks. He describes the systems that have been developed and are being operated by the UK Clearing Banks, and outlines some of the successes that have been achieved.

Mr Read writes: I was very surprised to read the Focus article which roundly attacked all aspects of banking systems.

If your correspondent wishes to contact me, I will be delighted to point out a number of serious errors of fact contained in the article (for example, changing a standing order takes from one to four working days, not the "prescribed six weeks").

I do not intend, however, to pick over the bones of your correspondent's many complaints, but rather to indicate the true nature, scale and general efficiency of the branch banking systems currently being operated by the Clearing Banks in this country.

Firstly, it should be said that bank computer systems are not beyond criticism. The core of current systems was designed some years ago and it is true of all major systems that, with the benefit of hindsight and taking full account of the rapid changes in technology and techniques, a second attempt should be better than the first, but to start again from scratch is hardly practicable and a process of continual review and evolution should be, and is being, undertaken.

Returning to my theme, however, I feel that it is often not appreciated that the major constraints on banking systems result not just from complexity, but rather from the sheer scale of operation. The number of cheques and other types of payments received by the Clearing Banks on a single day often exceeds 10 million.

Charles Read

In addition, unlike building societies, the Clearing Banks have taken steps to ensure that their customers do not have to go back to their own branch, for example, to draw out cash, but can use whichever bank branch happens to be convenient. With a combined total of over 10,000 branches covering the whole country, the need to maintain this flexibility of service often constrains the system options available.

The British Clearing Banks, therefore, have a systems problem which is literally unique. The daily volume of transactions (with peak rates of perhaps two million transactions an hour) is, as far as I am aware, very much greater than the volumes dealt with by any other system or group of systems anywhere in the world.

And look at the input. A cheque carries a great deal more information than just the account number and amount. The date, the signature, the person to whom the money is to be paid, the branch where the cheque was received, the branch where the account is held, whether the cheque is crossed, whether it is guaranteed; all of these and more affect the action to be taken by a bank, and most details will be handwritten on the cheque and cannot therefore be pre-encoded in magnetic ink.

What then are the real systems options, remembering that any development must ultimately be justified in terms of reduced operating costs or additional business revenue? Massive multi-bank real time account updating systems are unlikely to be economic on this scale, even if they are technically feasible, while, given the wealth of data contained on a single cheque, some form of full manual data capture and batch update system would require thousands of additional staff for both data input and validation procedures.

In the circumstances, the banks have taken the sensible initial step of using machines to capture the information magnetically encoded on cheques, and to sort them for subsequent delivery to the branch where the customer's account is held. The captured information is used to compute accounting and other control totals which help ensure that payments are not misrouted or lost.

The resulting system is both cost-effective and very efficient. Your correspondent is badly informed about the number of errors, which is so small as to look ridiculous in percentage terms, and, in addition, the vast majority of the tiny number of daily errors are detected and corrected by branches.

Banks are not complacent about their current systems; indeed they are continually seeking ways of providing a better service, although always at a price customers are prepared to pay.

Kaissa is defeated

THE second world computer chess championship opened last Sunday at IFIP in Toronto with a shock defeat for the world computer chess champion, the Russian program Kaissa.

Kaissa, running for the first time on an IBM 370 instead of an ICL System 4, lost to the No 9 seed, Duchess, from the American Duke Univeralty.

Before the incredulous eyes of a packed auditorium, which included a surprise visitor, the former world chess champion Mikhail Botvinnik, Kaissa unnecessarily gave away a Rook early in the game.

Although it is not a knock-out tournament, Kaissa is now virtually out of the running to retain the title, for which the favourite is the US program Chess 4.6 which beat two British challengers in the first two rounds, Queen Mary College's BCP and Master from the Atomic Energy Research Establishment.

Kaissa usually runs on the System 4/70 at the Moscow Control Institute and two Russian programmers had spent a fortnight in Toronto transferring the program to a local 370/168. During the transfer a bug had crept undetected into the system despite a number of test runs against human opponents.

IFIP 'revolutionaries'

●From front page

profession? We must all do more than we have in this area," he concluded.

Faulkner and Dr Kates looked at both the international and the nationalistic aspects of the information processing society. Faulkner called for the development of international "ground rules" to control the import and export of information processing services.

While not wishing unfairly to hinder free competition, he stressed it was important for countries like Canada to maintain an independent information technology capability.

"We cannot afford to be governed by interest groups in other countries," he said, aiming his remarks particularly at international processing networks and bureaux.

Dr Kates continued this theme by propounding the concept of "technological sovereignty." This concept he said, had been adapted by the Science Council of Canada as the prescription to Canada's difficulties of ensuring for itself an independent status in the global community.

"Technological sovereignty means the technological capability needed to support national sovereignty," he explained.

"This sovereignty must be based on knowledge and skills, must be selective in its areas of operation, specialised in orientation, and must control the use of imported technology."

● IFIP is a multi-national federation of professional/technical societies, such as the British Computer Society, concerned with information processing and includes representation from 35 countries.

17-hour trek

The Canadian air traffic controllers strike could cut the IFIP attendance by more than 1,000.

Conforanas organisers were expecting between 4,000 and 5,000 delegates to IFIP and its associated MedInfo conference. Early on Monday, the opening day, about 2,100 delegates had registered and the organisers were still hopeful of an attendance of about 3,500.

The strike started on the Sunday before the conference and meant that non-Canadian visitors had to fly to the nearest US airport. Visitors from London were faced with a 17-hour bus trek via Detroit.

NEWS IN BRIEF

IBM to buy 2.5m more of its shares

FOLLOWING the purchase of over 2.5 million of its own shares at $280 apiece earlier this year (CW, March 17), IBM has announced that it is prepared to spend up to $700 million to buy up to 2.5 million more.

It will buy shares offered to it from time to time at not more than the going market price, but is not interested in blocks of less than 5,000.

AGREEMENT has been reached on a new bid by Moore Corporation subsidiary, Moore Business Forms for the preference share capital of Lamson Industries.

UP to 18 SyFA minicomputers, hosted by an IBM 370/168 in California, will provide a data network spanning three continents under a contract signed by Computer Automation, manufacturers of the SyFA system, and the Fairchild Camera and Instrument Corporation.

RELEASED at the NCC in Dallas last month, Zygal Dynamics of Chesham, Bucks, now includes the Diablo HyTerm Matrix Terminal in its product range. The terminal operates at 120 chps, and Zygal has modified it to provide isolation to comply with Post Office regulations to enable it to be connected to PO modems.

Open day

An open day has been organised by Univac at the West London Stadium which, they say, is open to everyone. It's on Sunday August 14, and for the really enthusiastic it starts at 9.30. Among the activities there are a six-a-side football tournament, a beauty competition, and wally throwing. In the evening there is to be a disco with a talent competition.

The stadium is in Du Cane Road, near Wormwood Scrubs Prison, and anyone who wants to take part in the various contests or to offer teams for the soccer should contact John Trendall on 01-235 1010, extension 315.

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● Coupon on page 13

OP SPOT

THIS week a reader comes up with a solution to the question: What happens to old operators?

Fading away due to lack of recognition

IN OPSPOT of July 14, the question was posed: "Old operators never die, they simply fade away! But where?" John Shales, an operator from Broadstairs, Kent has an interesting solution to the problem.

Shales comments: "I believe that operators, in a lot of cases, are never given the merit or demerit due to them. I think it must be accepted that operators on shift are a part of a team, but they are consequently always judged as such.

"You often hear the phrase 'the night shift' or 'Nimrod's shift'. If something goes wrong, or if a problem is resolved with a good deal of expertise, very rarely is the credit given to the person directly responsible.

"The person who normally writes reports and incidents is the shift leader. His signature appearing on the form generally gives him the credit, although he may not necessarily be the technician. This situation probably arises owing to the remoteness of shift workers from the managerial staff.

"Would it not be fair to have the ops manager or chief operator work on each shift for a couple of weeks, maybe once or twice a year? He would act not as a participant or adviser, but purely as an observer to see exactly what happens.

"He would then see which of his staff had technical expertise and practical ability, and which were merely 'tape apes'. After all, how many DPMs know the qualities of each individual? I suspect that, in the main, they only know the strength of a shift as a whole.

"Therefore I submit that many operators fade away simply due to lack of recognition and financial reward commensurate with ability.

"My second possible solution is that quite often people who are employed as operators are over-qualified. If an installation requires people who will eventually progress to technical support, programming, and management, then this is great. If however, operators are wanted who will remain within the operations department, people who will be the backbone of the department, and who will get to know the systems inside-out, then Einsteins are not needed.

"While I accept that operators need to be intelligent, I would say that aptitude is equally or more important. How many times do you read an advert for operators' jobs which insist that applicants should have an 'A' level education? By that one statement, I would say that the field of applicants becomes much more limited and, just because a person has 'A' level qualifications, it does not mean that he is ideal for the job.

"After all, despite his 'A' levels, he may still not possess the aptitude for the job, if he does possess both aptitude and 'A' level intelligence, he will soon become dissatisfied, and if there are no openings for progressing, he will become bored, and may leave the industry altogether."

Calcomp to produce Solar line under licence

MORE details have now emerged about the agreement between Calcomp and SEMS under which Calcomp will incorporate Solar minis from the French company into a new line of off-line plotting systems (CW, May 12).

The initial batch of Solar minis has come from France, but under the agreement, Calcomp gets the right to manufacture the Solar line under licence, for incorporation both into the graphic systems and into other future Calcomp systems. In addition, if SEMS decides to market the Solar and Mitra lines in the US, it will be able to make use of Calcomp's service and maintenance network.

SEMS uses Calcomp's Trident disc drives with its minis, but a Calcomp spokesman in California told Computer Weekly that the minicomputer agreement was unconnected with the sale of disc drives to SEMS.

The merger between the minicomputer division of CII and Télémécanique to form SEMS into the largest European-owned general-purpose minimaker, is beginning to bear fruit.

Output of Solar minis more than tripled in the first half of the year, the company reports. During May, 50 Solar systems were delivered, bringing the installed base to 400. Production of Mitra minis at the CITEC factory in Toulouse, which builds the former CII line for SEMS, also increased. More than 300 systems were delivered in the first half of the year, and the installed base now exceeds 2,500. By comparison, DEC is currently building PDP-11 series minis at a rate of over 2,000 a month.

Almost 30% of the business placed with the company came from outside France.

To avoid excessive conflict between the competing systems in the Mitra and Solar lines, SEMS has decreed that the Solar line will be directed towards automation, process control and production control applications, and the Mitra line towards transaction processing, teleprocessing and network applications.

Among the more exotic contracts won by the company is one from Danish engineering company F. L. Smidth, which specialises in the design and implementation of cement works. Two 48K-word Solar 16-40 minis are on their way to Vietnam, where they will be used for quality control of the cement-making process, working on X-ray data. Similar use has been made by Smidth of SEMS minis in installations for Poland and the Popular and Democratic Republic of Korea.

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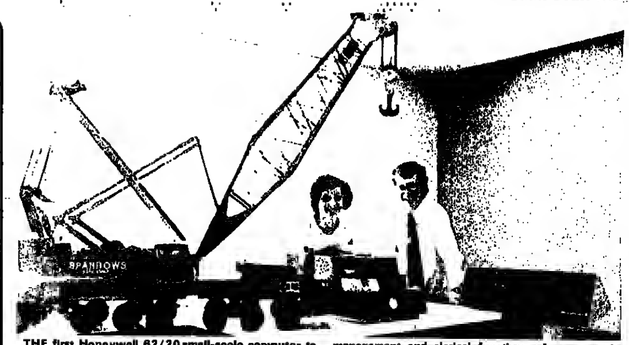

THE first Honeywell 62/20 small-scale computer to be installed in the UK is now on site at the Bath headquarters of G. W. Sparrow and Sons, the crane hire and lifting specialists.

The 62/20, which replaces an IBM System 3/10 installed three years ago, will be used primarily to provide management information. This will include profitability per crane, profitability per depot and a contract register to show the current status of each job. In addition, the system will also run the normal management and clerical functions of wages and salaries, payment of suppliers and sales and purchase ledgers. All these programs have been converted from the IBM versions to allow running on the 62/20, which is a basic system equipped with 35K of mass memory, 40 Mbytes of disc, a 200 lpm printer and a 96 column card reader.

● Jim Brown, the company's data processing manager, is pictured with Christine Murray in the new installation.

European PTTs offer links to US databases

FOLLOWING the lead set by the UK Post Office (CW, August 4), several other European PTTs are offering links to US databases.

The Dutch PTT has now installed an Tymnet CP-2 concentrator, based on a Varian V72 mini, and has begun offering an access service to databases on both the Tymnet and Telenet networks.

The French and Belgian PTTs are also offering the service; Switzerland plans to introduce it this month; and Spain and West Germany later in the year.

Tymshare Corp. which operates the Tymnet network, describes it as "a packet but not a pocket-switched network". The user is not involved in packet assembly and disassembly, but data from several sources and bound for several destinations is multiplexed together at each node in the network. There are four network control centres, but only one is active at any one time.

Early Tymnet nodes use the Varian 620/1 mini, and Tymshare has been right through the Varian line to the V72, but now uses Interdata 7/32s.

Distributors

IN the article by Nicholas Benwell headed "Deciding on the right magnetic peripherals" (CW, July 7), the name of a former distributor of the Comet Computing Systems Stockteller was inadvertently given. Distributors at present handled by Comet, but arrangements are now being completed for the appointment of new distributors.

UCC answer to the mini threat

RECOGNISING the threat to service bureaux from minicomputer systems houses, the University Computing Company has introduced what it calls a Total Service for its customers throughout Europe.

Under this, UCC supplies the client with a minicomputer system for local data entry and interactive file inquiry while continuing to process his big batch jobs at the UCC utility, all for one monthly charge.

The aim is to combine the best features of the in-house mini system and the service bureau.

UCC director of client services, John Harries, explained that under Total Service UCC selects the minicomputer system needed by the client, buys all the hardware, and installs it at the client's site. The customer's only capital expenditure, according to Harries, is on the interactive software UCC develops to interface the client's terminal operators with files on the mini system and at the UCC utility.

Batches of data created during the day are transmitted to UCC at night for file updating.

Harries said that Total Service is aimed at both technical and commercial users and can be offered as a less expensive and less complex alternative to a stand-alone in-house system like the ICL 2903, IBM System 3 or a medium to large mini configuration. In some cases it could be more effective than an in-house mainframe.

Total Service is a development of Service-3 introduced by UCC about 18 months ago. Under this the client combines local data entry and inquiry with batch processing at UCC, but he still selects, buys and installs the mini system himself. Ventek's Datapoint is one of the most favoured.

UCC already has two Total Service users. One is a major commercial organisation in Holland, an established UCC client, which now uses a multi-terminal mini configuration for local sales order processing, while continuing to transmit batch data to UCC in London. The other client is in Ireland.

John Harries conceded that the Total Service concept was not completely new, but said that UCC was the first to offer it in practice.

Although UCC's business from commercial clients is growing rapidly technical organisations still provide more than half its work and, according to Harries, a mini with Fortran would be selected for Total Service technical clients. Their batch runs at the UCC utility would typically involve big structural analyses.

Thames TV system for ad planning

A £300,000 system called Enterprise has been implemented by Thames Television to handle television advertisement sales planning.

The system is based on a 512K Honeywell 66/20 sited at EMI's Hayes office, and features six 200 Mbyte disc stores, six tape drives, three high speed printers, and three front-end communications processors.

Both salesmen and managers use Enterprise via VDUs on their desks, inputting bookings and requesting evaluations of planned advertisement campaigns. The system responds with the best timings and costs.

Previously, Thames relied on a semi-automatic system which involved the preparation of paper-tape from written sales documents which was then processed by computer.

SYSTEMS EDUCATION

BASIC INTRODUCTION

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ADM

Rapid growth seen in floppy disc market

THE number of units shipped by the floppy disc drive industry worldwide will increase by 33% a year over the next five years according to a study* from the Venture Development Corp, a Massachusetts-based consultancy specialising in the electronics industry.

The study predicts that the actual numbers shipped will grow from 145,000 in 1976 to 605,000 in 1981, and that sales of all types of drives will increase apart from full-sized non-IBM compatible models, sales of which will dwindle to nearly zero by 1981.

Sales of IBM-type drives from OEMs for non-IBM systems will grow from 103,000 units in 1876 to 392,000 in 1981. The study sees 75% of all floppy disc drives shipped by then having double density data recording. Double sided drives will account for 40% of all shipments by 1981.

Other trends include a rapid growth in sales of minifloppy drives from 1,000 units in 1976 to 76,000 in 1981, although VDC points out that they will not substantially replace full-sized units.

The biggest applications area for floppy disc drives by 1981 will be in small business systems rather than intelligent terminals, as now, because the latter will tend to be upgraded to the status of small computers over the period.

The study sees no serious threat to floppy disc drive sales from the emerging solid state technologies like bubble memories and charge coupled devices. This is mainly because they are too expensive and inconvenient for jobs where the media needs to be removed.

*Floppy Disc Markets II, 1977-1981. $950, additional copies $75. Venture Development Corporation, 1 Washington Street, Wellesley, Massachusetts 02181, USA. Tel: (617) 237-5080.

More opt for Seecheck

ORGANISATIONS opting for the Redifon Seecheck key-to-disc system include the General Register Office (Scotland), GEC Measurements, commercial vehicle manufacturer ERF, a Channel Islands based bureau EDP Jersey Ltd, and Hunting Engineering.

The General Register Office is installing a 12-keystation Seecheck to prepare births, deaths and marriages data for processing on an ICL 1903A.

The Seecheck at GEC Measurements at Stafford will be a decentralised system with 20 keystations in computer user departments, all generating data for processing on a 370/158.

Redifon has also won three local government orders. All the systems replace ICL data preparation equipment.

The customers are Dorset County Council, with a 24-terminal system with two 5-Megabyte disc drives; West Midlands County Council, with 16 terminals and one disc; and Wessex Water Authority, which is getting four terminals and two discs. Total value of the orders is over £150,000.

SBS seeks third earth station

THE Satellite Business Systems consortium, composed of IBM, Comsat and Aetna, has applied to the US Federal Communications Commission to build its third earth station at IBM's Research Triangle Park near Raleigh, North Carolina.

The station, required for development work during the SBS preparations, will be used to carry private line voice and high-speed data transmissions starting early next year. The stations already built are at IBM's Poughkeepsie, New York and Los Gatos, California factories.

Scottish papers £400,000 deal

ALL typesetting requirements for two of Scotland's leading newspapers, the Edinburgh Evening News, and The Scotsman are to be handled by a system being developed by the Software Sciences group under a £400,000 turnkey contract.

The installation will be based on twin Data General Nova 3/D minis and 30 Lynwood VDU terminals. System development will be aided by Software Sciences' subsidiary, Comprite.

Implementation is expected to take about seven months.

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Critic of decision tables standard gives reasons

FOLLOWING last week's news of objections to the British Standards Institution's standard for decision tables (CW, August 4), one of the foremost critics, Peter M. Bell, has itemised his criticisms of the standard. Bell has extensive experience of decision tables, having produced his own package, Oxtab.

He writes:

Decision tables are the subject of a British Standard published at the end of July "Recommendations for Decision Tables used in Data Processing" (BS 5487:1977).

One might have expected the standard to start with clear-cut definitions, to work through a crisp exposition, and to end by demonstrating the proof of what had gone before. Not a bit of it!

The standard starts cautiously, as if suspecting some inexplicable truth to emerge, edges its way round some basic misconceptions, and finally provides examples to prove that, given these misconceptions, a "balancing item" is needed (in the form of an ELSE rule) to achieve the proof.

One basic misconception concerns the number of condition states which are proper to particular forms of condition.

Consider a condition expressed in a decision table as:

```
CODE = A        Y N
```

The condition states for this condition are:

```
CODE = A
CODE = NOT A
```

Consider two conditions expressed in a decision table as:

```
CODE = A    YNN
CODE = B    —YN
```

The condition states for these two conditions together are:

```
CODE = A
CODE = B
CODE = NOT A AND NOT B
```

Consider these two conditions expressed in a decision table as:

```
CODE = AB
```

Clearly, the condition state "NOT A AND NOT B" is not represented above.

There is no acknowledgment in the standard of the NOT condition state described above. For this reason, an extended entry decision table is found to be incomplete when converted to a limited entry decision table; a situation promptly resolved by including an ELSE rule in the latter table.

For readers not aware of the function of the ELSE rule, the standard offers no enlightenment: it is not defined. There is, however, a recommendation that:

> 'alternatively, the condition entries in an ELSE rule are represented by dash symbols'

which, in conjunction with an earlier statement:

> 'the dash symbol "—" as a condition entry indicates that the condition is either irrelevant or impossible'

must make the ELSE rule either wholly irrelevant or wholly impossible.

On the other hand, the 'rule count checking' method described in the standard indicates that if the condition entries in the ELSE rule are represented by dash symbols, then the ELSE rule represents every combination of condition states for the whole table. So there it is! All or nothing. As an alternative.

In an apparent attempt to move on to firm ground, the standard recommends a rudimentary method of condition entry construction which is laborious and tedious in the extreme. The 'progressive rule development' method is quicker and more efficient, but is not mentioned in the standard. There is no denying, however, that the method recommended would work in all cases if the NOT condition state described earlier were taken into account.

It cannot be claimed that this standard will advance the state of the art.

UK team to upgrade dictionary

ENHANCEMENTS to US-based Cincom's data dictionary are to be the task of a team within the company's UK technical support group. This again emphasises the growing regard among multinational companies for their software development resources in the UK.

The enhancements, expected later this year, will increase the amount of information immediately available to the user on the data stored within the system, and will also simplify the immense task of initially building a data dictionary and keeping it up to date.

The most controversial of the new facilities will be an interface to allow the automatic updating of the data dictionary from the information contained in program source-code and database definition modules.

A similar facility has already been implemented for Cullinane Corp's data dictionary (CW, December 9, 1976). Although this clearly eases the construction and maintenance of the dictionary, some data dictionary experts have pointed out that it places dictionary update capability in the hands of the programmers. This, they contend, should be the province of the database administrator.

Cincom recognises this view, and UK operations manager John Hale pointed out that a database administrator could always forbid use of the facility after it had been used for the initial set-up of the dictionary.

As a later enhancement, and to some extent supporting the exclusive status of the DBA, Cincom is to produce a copy facility, allowing information from the data dictionary to be copied into the program to provide its data definitions.

Online updating of the dictionary will also be provided, input being through 3277 or compatible visual displays, under the control of Cincom's Environ/1 teleprocessing monitor.

The Cincom data dictionary is chiefly intended for use with the company's Total database.

Information system offered on 370

AN information management system for maintaining sales data has been developed by London consultancy Hill Price Davison. It is offered as a bureau service on an IBM 370, and will also be provided as a package, if required.

HPD was commissioned to develop a system by Quantum SA of Geneva, a company with which it had contact through HPD services to direct mail firms. Quantum specified the system, is using it and will sell it in Switzerland. Agencies have also been set up in Denmark and Sweden.

The sales information system maintains up-to-date records of accumulated sales and contacts. Reports can be generated on clients fulfilling certain conditions, or on the accumulated figures of certain salesmen or sales areas.

HPD is to make the system available through the Southwark Computer Services bureau. In-house, it will run on any IBM 360 or 370 under DOS, said the consultancy.

No firm contracts for the system have been signed yet, but HPD is "talking actively" to some impressive UK prospects.

"The service is getting more response in the UK than Switzerland", said HPD.

PROGRAMMER NOTES

The influence of standards on your working life

TO judge from the publicity given by computer manufacturers to their compilers' compatibility with ANSI and other language standards, it might be thought that this was a critical factor in their acceptability to the programmer.

This week, Programmer Notes has decided to conduct its own inquiry among programmers — the most important users of any language — on awareness of such standards and the extent to which they influence your programming life.

Do you, as a programmer, feel concerned whether the version of Fortran or Cobol you are using adheres to the ANSI standard or not?

A survey of minicomputer Fortran compilers, conducted by the US publication Datamation, has discovered that, while most of them implement the full ANSI 1966 standard, there is a tendency to extend facilities over and above this. A similar trend is evident in other languages, and would appear to defeat the main object of standardisation, in that a program using the extra facilities may not be transferable to another machine.

The survey authors suggest that installations concerned with standards should exclude these non-standard extensions or, at least, single them out in documentation as non-standard features.

How far do standards concern the average installation and the average programmer, however? Clearly, their main purpose is to aid portability, an aspect with which many installations are seldom concerned.

Does your installation insist on using an ANSI or other "standard" compiler? If so, why? Does the compiler have extensions to the standard? Are you and your fellow programmers allowed to use the language to its full potential, or are you restricted?

Leading on naturally from this topic is the general question of restriction of the language repertoire. Many installations rigidly exclude their programmers from using certain language features; not in the cause of portability, but in the hope of producing better programs.

The most notorious example of this practice is the elimination of the GOTO, but the advanced features found in an ANSI superset are also high on the list for exclusion.

Do you believe that this kind of restriction confers the benefits claimed for it, or does it merely handicap your programming efficiency and style. Should all programmers be allowed to use the full facilities available in their compiler?

One of the reasons for the evolvement of extensions is doubtless the age of some of the standards. A coherent picture of the extensions that programmers consider necessary may well be of help in influencing decisions on the features of future standards.

Puzzler

IF a needle, one centimetre long, is dropped at random on to the centre of a large flat surface crossed by parallel lines, all one centimetre apart, what is the probability (expressed as a fraction) that it will come to rest lying across one of the lines?

See page 31 for solution.

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ICL library package from CRL-Abacus

A SOURCE library maintenance program for ICL 2903 and 2904 machines has been developed by CRL-Abacus. Known as Ablib, it has been designed, says the company, to provide simplicity and time-saving features not available with the standard ICL library management routines.

For example, all records belonging to the library data base are held on a single file, and there is no need to copy information on to a separate file for amendment. The command format is claimed to be more straightforward than that of ICL's product.

The software is designed primarily for maintaining source program texts, but other types of data can also be accommodated, said CRL. Data may be retrieved from the Ablib library into ICL source library files, serial files or punched-card files.

Commands and library amendments are at present entered on cards, but an interface with ICL's Direct Data Entry terminal facility is being developed.

Network additions

LOCAL access to I. P. Sharp's APL time sharing service has spread to North West England and the Midlands with the opening of two new Sharp branch offices, equipped with packet-switched concentrators, communicating with its dual IBM 360/75s in Toronto.

The latest offices are sited in Birmingham and Warrington. The latter was chosen since it overlaps the local call areas of both Liverpool and Manchester.

US successes for Scicon's LP pack

A LINEAR programming suite developed by UK company Scicon has been taken up by a large US bureau. The company has already achieved marked success with the Scicon software, and gained several US users including an unnamed "major governmental body."

The package, Sciconic, has been released by Computer Sciences Corp, based in California. The bureau's Infonet network extends all over the US and into Canada, and separate networks have been established in South Africa and Australia where Sciconic has also been launched by CSC.

Linear programming — a technique of minimising or maximising a function of several variables — has proved appropriate to a wide variety of scientific and commerical applications, from transport planning to the mixing of cattle feed.

Scicon has long been prominent in the LP area, having earlier this year implemented linear programming on a minicomputer for the first time (CW, June 23).

CSC is the leader in bringing Scicon's products to the US. The bureau has previously taken Umpire, Scicon's earlier LP package, together with the Matrix Generator Generator and the Report Writer Generator, both valuable adjuncts to LP applications.

Despite CSC's name, the bureau's own products have concentrated on the purely commercial field to date. "CSC didn't even have particular success with Umpire," said a Scicon spokesman.

The immediate favourable reaction to Sciconic demonstrates the increasing interest in linear programming techniques, as well as improvements in Scicon's software. No other Scicon products have been taken by a bureau in the US.

Generally, however, the flow of software products, previously almost entirely one way, from the US to the UK, has begun to develop notably in the reverse direction.

Materials planning to aid production

INVESTIGATIONS by Package Programs of materials requirements planning (CW, May 5) have borne fruit in the form of a sales agreement for a US product.

And there is a chance of the software being adapted for ICL machines with a specific eye to the UK market.

Package Programs will market the Materials Requirements Planning package developed by Software International of Andover, Massachusetts. The UK company will couple sale of the system with advice from its consultants who, it claimed, have extensive experience in the application.

The MRP software enables the periodic materials requirement of a manufacturing plant to be calculated from production activity for periods ranging from one day upwards. Up to 52 different periods can be catered for concurrently.

A particular benefit of the package is that inevitable changes in plan, resulting from production rescheduling or unexpected availability of scrap material for recycling, can be dealt with by brief input amendments, rather than by complete regeneration of the plans, said Package Programs. Price is £31,500 for the IBM DOS version, and £45,000 for the OS version.

Aristos to look for further acquisitions

AN OFFICE has been opened in London by a Brussels-based software products company, whose product already has several in-house and bureau users in the UK.

Aristos' sole software at present is Finar, a financial modelling language, but a spokesman told Computer Weekly that the company is looking into the acquisition of further products in related areas, such as statistics and econometrics.

Finar operates in conversational mode on both mainframes and minicomputers, and is claimed to be portable, since it is written in Fortran or Basic. Such advanced facilities as paged virtual models and sensitivity analysis are claimed to be unique to mini systems.

Future development of the language, says Aristos, will be dictated by the needs of users, so Finar is likely to evolve in slightly different versions to suit national markets.

The language is currently installed on 10 machines in the UK, and is also available from bureaux Allen Computer Services, of London, and Datacall, of Leeds.

Implications of On-Line Systems takeover of the Atkins bureau

THE UK developed structural analysis package, Asas, will probably be marketed in the US now that Atkins Computing Services is being bought from the W. S. Atkins Group by On-Line Systems of Pittsburg (CW, August 4).

Asas, Atkins Structural Analysis System, was developed by Atkins R & D, another division of the W. S. Atkins Group. The rights to the package, which are held by W. S. Atkins, will not be transferred to OLS as part of the Atkins Computing sale.

However, US marketing of Asas will still be an attractive proposition for OLS, mainly because Atkins Computing has a team of Asas experts which could help OLS implement the package on its Digital Equipment DECsystem-10 mainframes at Pittsburg.

Asas is already run on DECsystem-10s and a variety of other mainframes at bureaux in the UK, including Univac 1100s at UCC and Scicon and the RXDS Sigma 9 machines at Atkins Computing. Bureaux in Paris, Munich, Zurich, Finland, Australia and Canada also run the package.

In the US Asas would compete to an extent with Nastran, the widely used package originally developed by the National Aeronautics and Space Administration. Nastran is run in the UK by SIA and the National Engineering Laboratory.

The deal between OLS and Atkins will probably not be completed until the end of September by which time it should have received approval from the Bank of England and the Treasury.

Most of the services provided by the two organisations complement each other, although one area involving some duplication is the APL services they both offer.

System X £20m contracts

● From front page

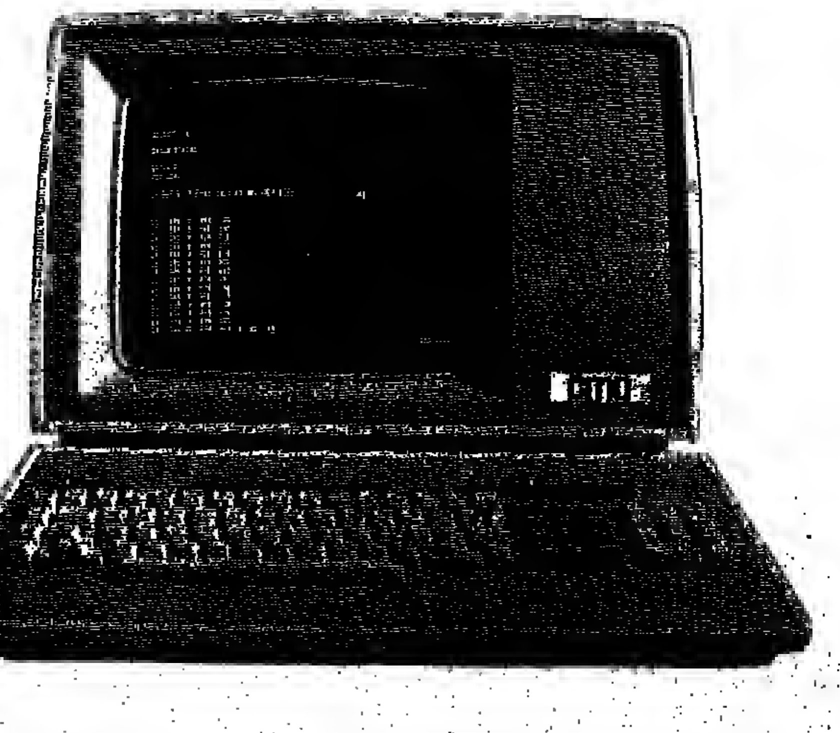
NEDC, but no decision has been made.

Also on the digital switching front, the Post Office has announced a new microprocessor-controlled private automatic branch exchange for customers wanting 100 lines or fewer.

Called CDSS-1, for Customer Digital Switching System, it is to be the standard for the 1980s. Based on microprocessors, it is being built to the Post Office's design by GEC and Plessey.

In contrast to IBM's analogue 3750 switching system, which is the most popular device among users wanting large capacity private exchanges, the CDSS-1 will use digital switching. Software packages for facilities like abbreviated dialling and storage of frequently used numbers will be offered as options, and users will be able to reprogram their own exchanges.

This terminal isn't the end of the line



Currently this is the CMC 'MK IV' key-to-disk terminal but in 1984 (yes: it's only seven years away!) a MK VI or MK VII will be ensuring that. . .

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Microprocessor News

Upgraded SBC-80/20 on offer from Intel

TWO upgraded versions of the SBC-80/20 single board OEM computer are now available from Intel.

The standard SBC-80/20 is now produced with 8K bytes of program memory on board, in place of 4K bytes. Also available is the new SBS-80/20 which has the read/write memory upgraded from 2K to 4 K bytes. Both are being sold at the same price and Intel consequently expects to offer considerable savings in systems costs in a number of medium scale applications.

These range from process control operations, where the doubled memory capacity is expected to be of particular benefit, through to front-end processing, intelligent terminals and distributed and multi-processor computing systems.

The other features of the SBC-80/20 are retained in the upgraded versions, including the bus arbitration control system. This allows up to 16 80/20 computers to share the same databus by providing automatic resolution of any conflicts that arise when two or more machines attempt simultaneous control of the bus.

In addition, several hardware problems, such as interface design, interrupt structure and control, and communications protocol are eliminated by using software control.

For systems requiring greater memory capacity than that held on the new CPU boards, additional memory cards are also available.

SC/MP retrofit kits from National

USERS of the National Semiconductors SC/MP microprocessor will now be able to evaluate the new SC/MP-II version of the device, following the introduction by the company of retrofit kits.

The kits have been produced to allow qualitative and quantitative comparisons between the two devices, and differ primarily in terms of operating speed and power dissipation. The new SC/MP-II version is claimed to operate at 4MHz, twice the speed of the original, while dissipating approximately 25% less power.

An additional improvement is the change in power supply requirements. The original SC/MP needed a +5 volt and — 7 volt supply which has now been reduced to a single +5 volt requirement to help reduce installed costs in terms of power supplies, and allow easier interfacing with other semiconductor components.

The retrofit kit in addition to the SC/MP-II CPU includes a 2MHz crystal clock and the necessary documentation. The clock is intended to be used to de-rate the operating speed of the CPU to that of the original SC/MP device for direct comparisons. Following evaluation, and the inclusion of changes necessary in systems software to cope with the higher speed, the SC/MP-II can be plugged in as a direct replacement for the earlier version.

Short courses at Hatfield

A SERIES of short courses on programming for microprocessors are to be run by the School of Information Sciences at Hatfield Polytechnic during the autumn term.

Two courses aimed primarily at engineers with little computing experience, will introduce students to the assembly and editing of microprocessor programs, and offer hands-on experience on a Motorola M6800 based system. The courses are either an eight-session, afternoon/evening course, starting October 5, or a 10-session evening course starting on October 11.

For experienced users, especially those already working with M6800 systems, the Polytechnic is offering a three-session, afternoon/evening course that will introduce the resident software for the M6800 development systems, together with the use of Fortran, Basic and Macro-assembler. Starting date for this is November 30.

Further information can be obtained from the School at Hatfield Polytechnic, PO Box 109, Hatfield, Herts AL10 9AB.

Greater M6800 throughput

MOTOROLA has increased the operating frequencies of its MC68A00 and MC68B00 microprocessors to allow significant improvements in throughput in systems configurations.

The MC68A00 is now available with an operating frequency of 1.5MHz, while the MC68B00 has been upgraded to 2MHz. Both operate at a minimum frequency of 0.1MHz, and have cycle times set between 0.666 and 10 microseconds for the MC68A00, and 0.50 and 10 microseconds for the MC68B00. In addition power dissipation for the two is reduced by 20% compared to standard M6800 components.

The greater throughput is available when the processors are configured in systems using the fast peripheral and asynchronous communications interface adapters, and the 68A10/68B10 random access memories.

South African micro

NOT content with obtaining microcomputers solely from overseas sources, South Africa now has its own indigenously developed product.

Known as the Commandar, the microcomputer has been designed and manufactured by Messina (Electronic) Development Co, a subsidiary of the Messina (Transvaal) Development Co.

Little is known of the equipment beyond the manufacturer's claim that it is more versatile "than the standard microcomputer". They are aiming the equipment specifically at applications in mining, industry and commerce in South Africa.

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Visual Display Units and their application
Edited by Derrick J. Grover
Chairman, British Computer Society Displays Group
Visual display units provide one of the fastest means of interaction with a computer, and they are being employed in industry in ever-increasing numbers. Their applications are wide-ranging, including airline-seat reservations, stock-control systems, information retrieval, stock-market and insurance quotations, text editing and information updating.
VISUAL DISPLAY UNITS is based on a tutorial seminar organised by the British Computer Society. The book is intended for computer users who already employ VDUs or plan to use them to enhance their system. It will be of equal value to management in their basic decision-making, and to the systems analysts and data-processing managers who put those decisions into practical effect.
contents
Review and trends Derrick Grover, British Computer Society
Technology of VDUs
Communications
Intelligence Ian Richards
Software Brian Lurbalestier
Human factors in the design of VDUs Roy Gladman, IBM
Human factors in the use of VDUs Tom Stewart, Loughborough University
The book also includes an extensive glossary of VDU terminology.
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PEOPLE

Rank Xerox wins National Management Game again

A TEAM from Rank Xerox has won the National Management Game for the second year running. The team, John Chappell, manager of asset planning, and Paul Webb, a senior business analyst, made a profit of over £10.8 million in the computerised game sponsored by ICL, the Institute of Chartered Accountants in England and Wales, the Financial Times and the Institute of Directors.

In second place was a team from Eley Ammunition, part of Imperial Metal Industries, with a profit of £10.3 million.

T. Wall and Son (Ice Cream) was third with £8.9 million, and Unilever fourth with £5.1 million.

The winners received a cheque *for £1,000* and a chance to play in the European Management Game in West Germany next month.

Harris Corporation vice-president named

RECENTLY appointed corporate vice-president of the Harris Corp information systems group in the US is Jack Davis, who will retain for the time being his position as vice-president and general manager of the data communications division (Nashua Operations).

The information systems group comprises four divisions: data communications, which is in Dallas, Texas, and computer systems, composition systems and controls, all in Florida.

Before joining Harris in 1962 Davis was a research engineer with North American Rockwell. He held various engineering, marketing and programming management positions in the radiation division before being appointed vice-president and general manager of the controls division. He was appointed to his present position in April 1974.

Eric Cole of Data Recognition has been promoted from senior sales executive to national sales manager. Former customer services manager Colin Knight becomes production manager, Commercial manager Mi*chael Hunt* takes on the additional responsibility of customer services, and Edward Gilmour, previously purchasing officer, has been appointed supplies manager.

Recently appointed systems development manager at Data Recognition is former engineering manager Ralph Godbold, and Peter Watts, who until lately was a senior engineer, has been made hardware development manager.

Paul Leppard has been appointed sales manager of Software Architects. A former sales director of Computer People in Holland, he returns to the computer industry after a year as licensee of a pub and restaurant.

Andrew Keberry has become financial director of Systima, allowing chairman John Parkinson to relinquish his financial duties, Keberry was formerly financial director of Associated Weavers Carpets.

COVENTRY software house Systems Resources advertised recently for a "friendly battle-axe to keep the directors in order." Nina Brett, who is 24, hails from Surrey and was previously with the Royal Agricultural Centre at Stoneleigh, Warwicks, got the job as managing director's secretary. Here she attempts a "binary chop" with a real battle-axe, courtesy of the Herbert Art Gallery and Museum. Nearest the razor-sharp edge is managing director Paul Ingrom, and Trevor Bucknell, production director, is trying to duck behind him.

Ian Cox has joined Applied Computing and Software as a recruitment executive to handle contract staff. He was formerly sales manager with New Opportunity Press. He replaces Sara Taverner who has transferred to the company's US associate, ACS America Inc as contract staff sales executive based in New York.

Death of Charles Sweatt

Charles Sweatt, vice-chairman of the board of directors of Honeywell Inc, from 1933 to 1960, died in Minneapolis on July 31, at the age of 92.

He was a son of William Sweatt, the founder of Honeywell. He joined the company as a salesman and director of advertising activities in 1917, became a vice-president and director in 1927 and was elected executive vice-president in 1945. He retired from active management in 1960, but remained on the Honeywell board until 1967.

Gold medal for systems analyst

SENIOR systems analyst John Jenkins has won a gold medal for the 50-metre freestyle swim in the National Paraplegic Games, held at Stoke Mandeville.

Jenkins works for Baric Computer Systems in Feltham, Middlesex where he is currently employed on a custom-built labour system and partsplan application for Hawker-Siddeley.

He lost the use of both legs after getting polio at the age of 5, but is interested in many sports, and besides swimming enjoys table tennis, shot putting, and discus and javelin throwing. He is a committee member and appeals organiser for the Windsor and Maidenhead Sports for the Disabled Society.

Bryan Thompson, CMC's new territory manager for the North-East, was formerly a branch manager with Computer Ancillaries Ltd.

Bill Edmonds and Tony Gray have been promoted from salesmen to branch managers with Data General. Edmonds will handle the London area, Gray the remainder of the South-East.

NRDC directors

THREE new members have been appointed to the National Research Development Corp. The three, appointed by Industry Secretary Eric Varley, are John Scholes, formerly manager of the corporation's computers and automation group and now engineering director; Steven Dollond, the marketing director, who was previously with Arthur D. Little; and finance director David Thomson who was formerly with Alfa-Laval.

Glyn Scantlebury has been made manager of Burroughs Bradford branch, having formerly been a product manager at the company's UK head office. Previously zone manager for the Stoke-on-Trent area, Keith Crawshaw has been named manager of the Wolverhampton branch.

Soccer

THE position at the top of all three divisions of the Summer Computer League is getting very exciting as teams approach the end of the season. The championship of each division seems to have developed into a straight fight between two teams and things are not likely to be decided until the very last game.

In division *one* Jadpu is the favourite with eight points from four games, although it has struggled to beat two low placed teams, FNS and Southwark. Gryphon is top with 10 points but it has played six games.

In division two Datascene beat second-placed Xerox to go two points clear with a game in hand.

Altergo and ICL both have 10 points from six games in division three. Both teams have to play British Rail but in their other match *Altergo should have little problem* with BIS while ICL faces Airfix.

Latest results and league tables:

Division I
FNS 5, Computing 0
Gryphon 8, SIA 2
Jadpu 4, FNS 3

	P	W	D	L	F	A	Pts
Gryphon	6	5	0	1	35	6	10
Jadpu	4	4	0	0	38	9	8
Lolo Trosp	6	6	1	2	19	14	7
Lloyds	4	2	1	1	6	7	5
FNS	5	2	0	3	13	10	4
Constance	4	2	0	2	13	10	4
S'wark	6	1	1	3	10	12	3
Computg	5	1	0	4	7	64	1
SIA	5	0	1	4	8	22	1

Division II
Altergo 5, Xerox 2
Reuters 5, Computer Weekly 0

Top positions	P	W	D	L	F	A	Pts
Datascene	0	6	0	0	35	1	11
Xerox	7	4	2	1	28	17	10
Reuters	6	4	0	1	22	5	8
Computer Weekly	6	3	1	2	18	11	7

Division III
Datasolve 9, BIS 0
ICL 7, Control Data 2

Top positions	P	W	D	L	F	A	Pts
Altergo	6	4	2	0	34	11	10
ICL	6	5	0	1	26	9	10
JM	8	4	1	3	27	17	9
Con Data	8	3	1	2	24	20	7

Michael Richardson-Bunbury, until recently a sales executive with UCC, has been appointed manager of UCC's client service centre (formerly Wates Computer Services) in Norbury, South London. He replaces Bill Watts who moves to Birmingham as manager of UCC's commercial applications division.

Gruszka Kaberry

Ron Burnip, UK sales manager of AMI Microsystems, takes on the additional responsibility of sales in Scandinavia. Stuart Gruszka joins AMI as a sales engineer, after holding the same position with Memec.

Liveware File by Don

CONFERENCES

DIGITAL Processing of Signals in Communications is the title of a four-day conference to be held at the Loughborough University of Technology on September 6-9. It has been organised by the Institution of Electronic and Radio Engineers. Ralph Benjamin, Chief Scientist at Government Communications Headquarters, will open the conference on the subject of the role and *scope of digital processing in communications* systems. Details from the Conference Secretariat, IERE, 8-9 Bedford Square, London WC1 3RG, tel: 01-637 2771.

CONVENTION Informatique is the European data processing conference which takes place in Paris as part of Sicob, the international exhibition of DP hardware and communication and office equipment. The theme of the seventh Convention — which is divided into four sections, under the headings data processing management, software aids, data distribution and users' forum — is to be Computing under Control, and for many of the sessions simultaneous interpretation will be available. The conference will be held at the Palais des Congrès, Paris on September 19-23 and further details are available from Convention Informatique, 6 place de Valois, 75001 Paris, France, tel: 261 52 42 — 261 46 21.

THE electronic components exhibition, also held in Paris, le Salon International des Composants Electroniques, will be *open to exhibitors of the following*, active, passive and electromechanical components, measuring instruments, materials and products of special interest to the electronics industry, equipment and methods specific to the manufacture and installation of electronic components. The exhibition is organised by the Société pour la Diffusion des Sciences et des Arts, and will be held at the Parc des Expositions on April 3-8, 1978. Exhibitors' files may be obtained from SOSA, 20 rue Hamelin, F 75110 Paris, tel: 33.1 505 1317.

A THREE-DAY tutorial conference on software for numerical optimisation has been organised by the National Physical Laboratory and will take place at the Hotel Russell, London on March 20-22, 1978. It aims to bridge the gap between those who develop mathematical methods and write software, and the ultimate user, and discussion will centre on the optimisation software which will be available from the NPL and NAG libraries from March 1978. The conference is designed for engineers, scientists and economists who wish to use optimisation techniques and to gain access to the relevant software. Registration forms and further details from: Dr P. E. Gill or Dr W. Murray, Divisional of Numerical Analysis and Computing, National Physical Laboratory, Teddington, Middlesex TW11 0LW.

A CONFERENCE on applications of machine-aided image analysis will be held in the Nuclear Physics Laboratory, Oxford University, on September 4-6, 1978. All applications areas will be covered in talks by invited speakers from Europe and North America. The conference is sponsored by the Institute of Physics of Oxford University. Further details are available from the Conference Secretary, Dr David J. Stanley, 8521, Harwell Laboratory, Oldcot, Oxfordshire OX11 0RA, tel: 0235 24141, ext 5082.

A CONFERENCE on computer simulation organised by the United Kingdom Simulation Council will be held on April 4-6, 1978, at the Grosvenor Hotel, Chester. Topics will be grouped under the headings simulation systems, simulation methodology and simulation applications. Further information is available from Dr J. L. Hay, UKSC Conference Secretary, Dept of Electrical Engineering, University of Salford, Salford M5 4WT.

DIARY

AUGUST 16-18
Operational data security workshop. University of Kentucky. The City University, London EC1.

AUGUST 21-26
Law of the world conference. World Peace through Law Centre. Manila, Philippines.

August 24
Meeting. UK and Ireland VM370 Users Group. Commercial Union. Details: Jeff Cribbin, 08832-333.
What kind of manager are you? OPMA. London W1. 18.00.

SEPTEMBER 6-9
Compcon 77 — micros, minis and maxis. IEEE (USA), Washington, DC.

Digital processing of signals in communications — conference. IERE. Loughborough.

SEPTEMBER 7-9
Symposium on data analysis and informatics. Institut de Recherche d'Informatique et d'Automatique. Rocquencourt, France.

SEPTEMBER 14-16
Society for Management Information Systems, annual conference. Dallas, USA.
Details: SMIS, SUITE 2026, 221 North LaSalle Street, Chicago, Ill 60601, USA.

SEPTEMBER 19-22
Applications of numerical software, conference. Institute of Mathematics and its Applications, Southend. University of Sussex, Brighton.

COMPUTER WEEKLY

The following special supplements are due to be published during

AUGUST/SEPTEMBER

COMPUTING AND THE ACCOUNTANT

August 18th

[illegible]

DISTRIBUTED COMPUTING FEATURE

August 25th

Distributed computing — what does it mean? Is computer technology ready for it? What are the security problems? How are users going about implementing distributed systems?
Answers to these questions will form the basis of a Computer Weekly supplement on Distributed Computing on August 25th, when users, suppliers and consultants will put their cases for and against the growing industry trend.

INTERNATIONAL EDITION + BONUS CIRCULATION

SICOB PREVIEW

September 8th

In September, Paris awakens from its August holiday slumber to falling leaves and SICOB, one of the major European computer shows.

Computer Weekly, of course, has no summer rest and our international issue on September 8th will be filled with its usual wide ranging coverage of the world computer scene, including a special preview of this year's SICOB. Where Computer Weekly will be exhibiting for the first time and additional copies of this special issue will be distributed from our stand. With an overall distribution of over 95 000 (U.K. 73,973, Overseas 21,248) this issue will provide an ideal opportunity for export minded companies to display their products, equipment and services to this unique audience of decision makers throughout Western Europe.

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Stop Press: Computer Weekly continues to publish more product and recruitment advertising and has a higher fully regulated A.B.C. (Audit Bureau Circulation) of 73,973, than any other U.K. computer publication. + Additional 21,248 [illegible] readers in Western [illegible] via INTERNATIONAL EDITION which is published the 2nd week of [illegible] month excluding August and December.

USER FORUM

A page in which users can air their views on issues affecting day-to-day data processing
Edited by John Kavanagh.

Whether to buy, hire, or lease...

WHEN you have looked at all the computers on the market and chosen the one that seems to match your computing needs, don't relax because the selection job is still far from over. For the differences between the manufacturers' payment conditions could well put you off your first choice, whatever the computer's technical merits.

The first decision to make is whether to buy, hire or lease the computer. Leaving aside tax and other accounting considerations which will vary according to users' circumstances, the decision on buying outright could depend on the length of time the computer is to be installed, when the money is paid and how much protection the customer has from any price rises which might be made between the time the computer is ordered and the time payment is due.

The sale-to-hire ratio varies considerably. ICL hire customers pay the purchase price of their computer after about 45 months of hire payments. A 36-month period is put on items with relatively short lives such as terminals which might get a physical hammering.

At Honeywell the period is between 45 and 50 months; at IBM it is about 40 months but depends on the type of contract; at NCR a standard 48 months, while at Burroughs the period is between 55 and 60 months. Control Data said the period varies by configuration.

All the periods refer to hire charges only and exclude maintenance.

If you buy outright you pay the delivery time price to ICL, NCR and Burroughs. Honeywell customers are protected from price rises in the last three months before delivery, and IBM customers get six months' protection.

Control Data customers pay the price current at the time of ordering, but they also pay a supplement linked to the price of the dollar in the UK at delivery time.

The time the money falls due also varies a lot. Burroughs, Honeywell and IBM are paid on acceptance of the computer, while ICL customers pay 75% of the price on delivery and the rest on acceptance. NCR asks for a 10% deposit at order time and the rest on delivery, while Control Data describes its payment conditions as flexible; if users want to pay in advance because of advantageous dollar exchange rates, they can.

Standard hire contracts range from one year at ICL and two years at Honeywell, to two, three and five years at Burroughs, and one, three and five years at Control Data. IBM offers a number of rental plans. There are no standard length contracts at NCR, but customers have to keep their machines for two years before changing them.

An alternative to outright purchase or hire is leasing. In this case a leasing company buys a computer from a manufacturer and leases it to the user. The leasing rates are normally lower than the manufacturer's hire charges, but the customer usually has to sign to use the computer and thus pay the leasing company for five years or so.

A fairly common practice is to buy from a manufacturer, sell to a leasing company and then lease the computer back. This means the customer has both the computer and the cash, although it looks to the manufacturer as though the user owns the machine.

Manufacturers themselves follow this practice. ICL, for example, sells its computers to Computer Leasings, a leasing company in which it has a small share. Computer Leasings leases the computers to an ICL subsidiary called IC (Rentals), which hires them to customers. This gives ICL the cash for its hired computers immediately.

So you pay your money and make your choice. If you prefer to do what most other people do says ICL, between 50 and 60% of its customers hire while the rest of its machines go to outright buyers, either leasing companies or end users.

Univac would not give details of its hire and sale conditions. Our thanks to the other manufacturers for their co-operation.

Epoch tape stretches to 3,600ft

THE Epoch 4 magnetic tape made by Graham Magnetic in the US and sold in the UK by the London based firm Allison Computer Media, is now available in lengths of 3,600 feet. Because of the thinner mylar which is normal on tapes of such lengths, the 20-year guarantee available with the other Epoch 4 tapes does not apply.

Allison says that the unique Epoch 4 binding system makes it 80 times tougher than other tapes and reduces headwear by 95%. In the US Epoch 4 tapes have gone through more than two million passes without error under controlled conditions at a government test site.

Allison has also introduced a nylon ribbon suitable for the Diablo Hytype II daisy wheel printer. The ribbon, made in the US by Pelikan, is in a cartridge and measures 6.35mm by 20 mm.

PROFILE:

ICL International Retail Users' Association

THE ICL International Retail Users' Association was formed in 1975 at the suggestion of Singer, before the takeover of its computer operations by ICL. And the withdrawal by Singer from the point-of-sale business was one of the main reasons for the present strength of the association.

"The value of a collective voice, particularly for smaller users in countries with only a limited number of point-of-sale installations, was immediately apparent," says Philippe Lecamp, the association's chairman. "We ensured that third party maintenance contracts were arranged, and we fixed up support in the form of documentation or people, for users who were in the middle of installing systems."

Lecamp says that although a sense of relief was felt at ICL's assurance of continued support, the association has not been complacent. It was found, for example, that ICL maintenance charges varied by 19% between countries. The association negotiated a reduction for users paying the highest rates, while the lowest rates were unchanged.

In addition the association has persuaded ICL to provide full maintenance cover six days a week. This is particularly important for retailers, who have their busiest times on Saturdays.

The association is now pressing for greater reliability of data collection hardware and for more advanced software for data manipulation.

There are about 90 members in Europe including departmental stores, cash and carry stores, and duty free shops, but excluding food shops because the volume and short *life of low-priced* products means that these shops take a different approach.

Discussions are in hand on the possibility of the association becoming part of the ICL Computer Users' Association.

MEMBERS of the Data Recognition Users' Association had the first of a series of informal talks with senior managers at the company last month. Managing director Roy Roper is seen here describing Data Recognition's 9300 optical mark reader. The association's secretary John Stanfield, from J. Sainsbury, is on the far left. Other association members who attended the meeting were representatives from Shell, Charing Cross Hospital, Waddingtons and Devon County Council.

Unhindered access to computer for the internal auditors

USER VIEW

THE auditing of systems run on computers has cropped up again this month with a survey of local authority installations by the Local Authorities Management Services and Computer Committee.

But, says Lamsac, internal auditors are showing *little* inclination to take up the challenge of using the computer both as their hunting ground and as their most effective tool.

"Among the negative reasons given were difficulty in forecasting the scope and direction of future development, inadequate staffing of the audit department leading to inability to cope with the workload, and finally the absence of rules to guide auditors in the use of *computers* in audit work."

All the installations agreed that auditors should be involved at the system design stage, but many thought that the existence of a record on a file was sufficient proof of a transaction.

As Lamsac points out, the record's existence does not necessarily indicate "whether a link or audit trail exists between records belonging to the same event on different files and hence does not guarantee that the programs work properly."

The survey found that at one installation "internal audit only called for complete file print-outs and very rarely attempted to trace transactions through the computer system."

The lack of auditors' experience of computers could explain the survey's finding that the computer *console log and* database management system logs are rarely used to follow audit trails. Lamsac describes the console log as "by far the most important source of information".

The installations questioned generally agreed that the ideal situation would be for internal auditors to have unhindered access to the computer and possibly even take it over at *auditing times*.

The audit reviews would best be done using a display terminal to look at files and trace transactions through application and operating systems. This could be carried out with little interruption to the workflow.

However, as Lamsac points out, this approach depends on the internal auditors having wide experience of computer systems. Despite pleas from the industry *for closer co-operation* between computer departments and auditors there is little sign of auditors gaining that experience.

ICL plans improved customer support

MORE efficient customer support brought about by wider training for engineers, better planning of spares distribution, and the development of diagnostic routines which will enable the user to pinpoint problems, is an important part of ICL's business plan for the next five years (see page 32).

ICL says customer engineering is "the solid base on which continued customer satisfaction rests".

At the same time the company says its support activities must continue to be profitable; and it intends to achieve the improvements with a sales and support staff only one-third bigger than at present.

"Efficient use of engineers entails putting fewer on individual customer sites and making sure the right man is sent *to* trouble-shoot when necessary," says the company. "ICL continues to develop diagnostic routines, some of which will be used by customers to indicate the nature of faults so that they can accurately pinpoint problems."

Engineers now spend 10% of their time being trained. ICL expects this percentage to increase as new skills will be needed to service large growth products such as point-of-sale terminals.

ICL is now working on reducing its investment in spares, which stands at £25 million and covers 200,000 different parts.

"Since no sacrifice in quality of service can be made," the company says, "scientific techniques will be used to discover the minimum amount of each item that must be held.

NCC guide to contracting for a successful installation

NEW ammunition for users in the battle for better installation contracts has been provided by the National Computing Centre in the form of a 25-page guide* to the contract conditions customers should consider when discussing a potential order with a supplier.

But whether the guide will enable users to get better contracts remains to be seen, for manufacturers are often unwilling to accept amendments to their standard contracts. A survey by the IBM Computer Users' Association showed that none of the 650 members had won any change in the standard contract.

These findings are backed up by a comparison of manufacturers' responses to requests for additional contract clauses. The comparison was recorded by Dick Brandon and Sidney Segelstein in their excellent book* on contracts (CW, October 14, 1976). Out of a possible score of 275 Univac got 220. The closest after that was Burroughs with 156 and Honeywell with 113. IBM scored 63 and the standard contract was a poor last with 10.

The NCC guide points out that "failure through lack of information has caused installations to come to grief because occurrences had been overlooked in the contractual arrangements".

It adds that the computer suppliers' willingness to negotiate could be a big consideration in choosing the computer: "Contractual installation implications arise long before actual installation and may even be a matter for consideration during the initial computer feasibility stage."

The booklet does not set out to be more than a guide but as such it is exhaustive in its lists of possible contract conditions to consider.

The technical section covers the electricity and air conditioning needed, the floor load, commissioning procedures, system expansibility and support facilities such as maintenance, training, standby and software conversions.

The second section, on legal considerations, covers the pricing structure, date of payment, warranties, limitations of liability, possible infringements of patent of copyright of hardware and software, and procedures to be followed if there are disputes between the supplier and the customer.

The appendix gives brief details of relevant legislation.

* Computerguide 12: Computer Installation Contracts. 25pp. £2. plus 25p postage. J. M. Dent & Sons (Distribution), Dunhams Lane, Letchworth, Hertfordshire.

*Data Processing Contracts, by Dick Brandon and Sidney Segelstein. 477 pp. £19.95. Van Nostrand Reingold Company, Molly Millars Lane, Wokingham, Berkshire.

Disreputable distributors

PROTECTION for users against disreputable distributors of computer stationery is the aim of the recently-formed National Business Forms Marketing Federation.

The federation says membership is open only to "those bona fide operators who offer reliable *personal service* backed by proven business expertise and finance, who are able to provide flexibility in obtaining the best product and terms to suit individual companies' needs, and who have the capacity to retain stock lines to meet demand as and when it arises."

A federation spokesman said there were some disreputable distributors, and small computer users who did not use much stationery could get caught out.

The federation is vetting companies which have applied *for membership*.

Users wanting a list of companies with the federation's stamp of approval can contact it at Bank Chambers, 211 Lower Addiscombe Road, Croydon CR0 6HH.

Word processing for £75 a month

WORD processing systems are now available from Saggicorn Investments for short-term rental, at about £75 a month. The machines are refurbished SE500 automatic typewriters with paper-tape punch and reader, or with magnetic card input/output, and the minimum rental period is three months.

FILE DESIGN

By Owen Hanson — Part 7

DATA 1	KEY 1	KEY 2	KEY 3	DATA 2	KEY 2	KEY 4	DATA 3	KEY 1	KEY 4	KEY 5	KEY 6
RECORD 1				RECORD 2			RECORD 3				

Figure 1a (above): Serial File. Note that keys may be appropriate for more than one record. Figure 1b (below): Note that data will be referred to by the records for each of its keys, but that data will only be stored in complete form once.

KEY 1	ADDRESS OF DATA 1	ADDRESS OF DATA 3	ADDRESS OF DATA 4	…	ADDRESS OF DATA n	KEY 2	ADDRESS OF DATA 1	ADDRESS OF DATA 2
RECORD 1								

MOST data processing applications use a single record key, or at most a limited number of keys. The type of application in which a selection is made from o set of records, based on some input requirements, is an exception to this. Thare are no longer any particular "keys" as such; instead, ths record has to be searched using some combination of keys provided by the user.

Typical selection applications might be personnel or library handling. In the first case, a group of FEMALE employees who can SPEAK GERMAN and are UNDER THIRTY might be required. Employee records would be scanned, using the boolean conditions (female) AND (Speaks German) AND (under thirty). Records satisfying all three requirements would be selected.

The keys above are fairly definite, although "can speak German" may prove to be a variable ability. In library applications keys are far more subjective. The easy way to define keys is to use the significant words in the title. However, titles may be intended to be striking rather than informative. Even author abstracts can be misleading.

The safe way to select appropriate keys is to have each article, book, etc, examined by an information specialist in the field, in order to allocate the keys.

However much care is taken, information retrieval is likely to lead to some irrelevant articles being selected and some relevant ones being missed.

Selection of records will be on the basis of boolean conditions such as AND, OR, BUT NOT IF. There should also be provision to broaden an inquiry if no records match the original conditions, or to narrow it if too many records are selected.

Order of keys is also important — MANAGEMENT INFORMATION SYSTEMS are not usually INFORMATION MANAGEMENT SYSTEMS. Other desirable facilities are that synonyms should be acceptable, ie MAIN or CORE STORAGE/MEMORY, and that root words such as INTEGRA*** should yield a hit with integral, integrate, integrated, etc.

Computer systems that provide these functions require specialist files and record formats. All possible keys must be in a predetermined position or sequence, in order to allow searching to be carried out. The format depends on the type of file used.

Serial file handling

The simplest arrangement of records is to store them in order, with the record first followed by all its keys, in the format shown in Figure 1a.

This file organisation has the advantage that addition of new records is straightforward; they are added at the tail of the file. It is also convenient for boolean testing, as the records are examined one by one to see if their keys meet the conditions laid down.

The disadvantage of this method is that every record in the file has to be examined, to deal with a single inquiry. When files are small this is not a drawback, but when there are 20,000 to 30,000 records the time taken is so long that it is better to use a different file organisation.

Inverted file handling

In order to avoid scanning every record, the keys and data can be organised as shown in Figure 1b. Using this "inverted" arrangement, the keys given in an inquiry can be checked one by one, and only the relevant keys have to be referenced.

For example, using the information in Figure 1, the inquiry (key 1) AND (key 2) would only produce data record 1, while (key 1) OR (key 2) would yield data records 1, 2 and 3. In each case only two records (those for key 1 and key 2) would be referenced.

If the file is large, this allows a far greater volume of inquiries to be handled than is possible using a serial file.

Inverted files pose an update problem, in that records throughout the file are changed when a new data record is added, if any of the keys of the new record have been used previously. Larger work areas are needed for boolean operations, which limits the complexity of the logical expressions that are allowed.

For many applications — personnel, computer dating, etc — choice of file organisation is a matter of file size. The typical library application is rather different.

Library information retrieval

Two services that are well suited to computer systems are a Retrospective Search through the whole of a library, and the selective dissemination of information (SDI) that aims to let users know which new additions to the library collection are of particular interest to them personally.

In the second case each user will have a separate profile of interests, in the form of a boolean expression that is run against new accessions.

The two are different in that an SDI service will handle relatively small files, and a retrospective search usually deals with large ones. A number of commercial systems use the technique shown in Figure 2 to batch input, so that updating of the main file is relatively infrequent.

These services can be useful for personnel type applications, but their main use is in libraries, where a further problem will be the relevance of the retrieved information.

Accession lists are often discarded because pages of irrelevant material have to be read. However, most users would accept one useful article in three or four, and thus a relatively low relevance, defined as (number of relevant documents) ÷ (number of documents retrieved).

Missing relevant articles because they are not retrieved by the system is a more serious problem. This is measured by recall, defined as (number of relevant articles) ÷ (total number of relevant articles). As the user gets no indication of articles the system has failed to locate, it is important that most of the relevant articles should be retrieved, even if this means that the relevance is lowered.

A system will give different results for different inquiries, but the curves shown in Figure 3 are typical of good and bad systems in operation.

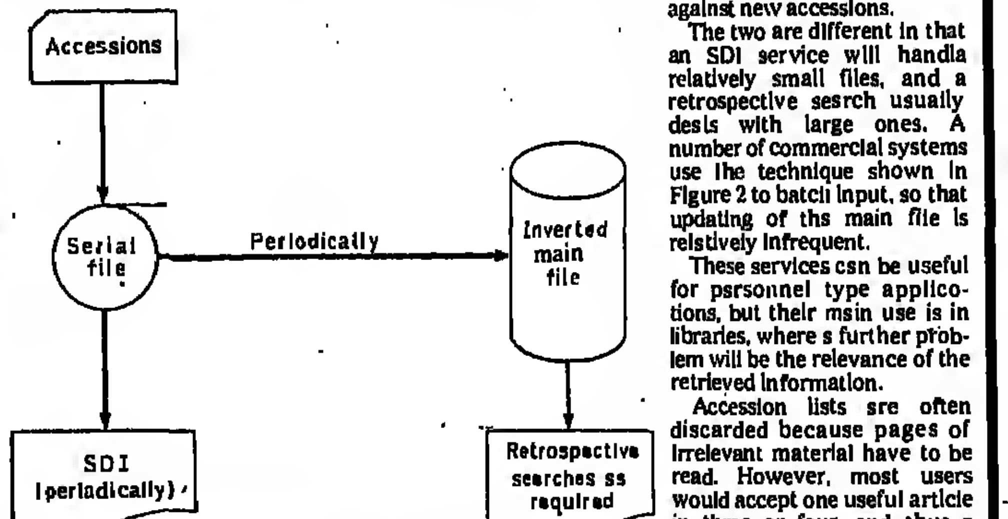

Figure 2: A system that uses both serial and inverted files. The main file need not be updated with the same frequency that SDI reports are provided.

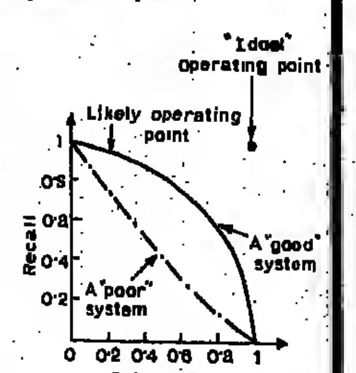

Figure 3: The system will be run with high recall and relatively low relevance to avoid loss of information.

LETTERS

Lack of interest in operations room

I REFER to Wade Bruce's letter (CW, July 23) and would agree in principle that indeed there is a great lack of technical knowledge in the operations room, but would debate that the cause is not lack of formal training but prominent apathy or simply lack of interest.

ICL, after all, provides the 1900 operator with courses and manuals which should leave him with all the knowledge of operating, direct access and utilities he is ever likely to require as an operator. Anything else he picks up may well be interesting and a bonus, but effectively it is of little practical use to him, and can also be very dangerous, as Mr Bruce has shown.

PLAN is a very low level language and as such can be very "hairy". By the same token, however, it is very powerful and has a great many facilities. It is not the easiest of languages to master. After about two years' good programming experience one can call oneself a PLAN programmer with reasonable confidence.

I make this point to try and illustrate the danger in an operator with no experience of programming attempting to analyse the efficiency of a live program and then suggesting tuning methods to improve it when perhaps all it does is display a little too often or seems to be taking longer than usual. The causes could be as simple as year end processing, holiday pay additional calculation, etc.

I am not saying that all programs are efficient. Indeed I agree that there will always be inefficient user programs.

In some cases the reasons may be unavoidable; in others it could well be bad program design, inferior coding etc. But it is not the responsibility of an operator to determine the cause. I think the reasons for this are fairly obvious.

Systems tests, proving runs, operators' comments on the run sheet are all areas where inefficiencies can be highlighted. The proving run is perhaps the best example, when a system is being proved for operational acceptance. This is designed essentially for comments and observations from the operations department.

Finally there could not be a great deal of control in Mr Bruce's installation before the operators can suggest program amendments to programmers. Surely the right way to do this would be via the operations manager and chief programmer who can then determine whether an amendment is justified or not. After all programmers are allocated work just like operators.

What would happen if a programmer went into the machine room and said, "Could you just run this little XPJL for me, it won't take a minute"? I think the response to this approach is fairly common throughout most installations!

Leave the PLAN programs to us Mr Bruce and stick to your UDAS and DIRECT ACCESS manuals.

FRANK WILLIAMSON,
Chief Programmer,
Lawsons
Aberdeen.

Information please

I AM searching for information and/or programs concerned with the automation of the design of crossword puzzles.

I believe some research work has been done in the US, but as yet I have been unable to locate references.

I should be most grateful if any of your readers could provide information.

(Mrs.) E. HOCKLEY,
Technical Librarian,
F. International Ltd.,
The Bury,
Church Street,
Chesham,
Bucks. HP5 1LB

Progress of Ovshinsky

THE story headed Memories with the Speed of Light (CW, July 21) reminded me of Ovshinsky's extraordinary career.

Ovshinsky contravened the sociological norms, firstly by being a self-made man rather than an academically prestigious researcher, and secondly, by allegedly unconventional procedures associated with the publication of his milestone article (Phys Rev Lets 21, 1450, 1968). His research may have been controversial, but the behaviour of the establishment towards him was undoubtedly affected by the above factors.

In an analysis I carried out of literature on amorphous semiconductors (J Amer Soc Info Sci 25(2) 1974), I ventured an opinion, formed by studying the literature network, that Ovshinsky's work may not have been judged solely on its merits.

An interesting facet of the specialty was a change which became evident around 1973. Until that time most of the articles had been authored by academics. Articles then started to emanate from companies and often included the word application in their titles. This indicated that practical devices were emerging from the research. Your article indicates a further movement in that direction.

A. E. CAWKELL
Director of Research
Institute for Scientific Information,
132 High Street,
Uxbridge, Middlesex, UB8 1DP.

Repudiate article —plea to BCS

I WAS surprised and intrigued to find that my letter (CW, July 7) drew forth such a prompt reply, and one from so high a level as the president of the BCS (CW, July 14). However I was disappointed to find that the second of the questions which he endeavoured to answer was one which I had never asked at all — "Why does the BCS have a marketing committee?"

As far as marketing committees are concerned I was not so much interested in posing the very obvious question of why do they exist ("to make money to hold down net costs to members", to quote the president's own words), as in obtaining views of their relevance in the context of professional organisations such as the others which I mentioned.

Nevertheless, his first and third answers proved most gratifying. It is good to know that the BCS does not claim that membership in itself is necessary or sufficient proof of competence, and recognises the value of "the (important) subjective measures of individual interview, judgment and choice".

It is also good to know that the higher echelons of the Society do not see its role as being solely concerned with the protection of its members' interests.

All that now remains is for the BCS entirely to repudiate the article which originally provoked this correspondence (CW, June 23), in which a spokesman appeared to suggest that this was the case with his claim that "The only safe way open to employers" in the matter of employee selection was to choose members (including student members!) of the BCS in preference to outsiders, and we can rest assured that the Society is indeed living up to its president's fine words.

K. A. JOHNS,
Welsh National School of Medicine,
Cardiff.

Seeds of destruction.....

DR. CHRIS EVANS missed a vital point in his review of the history of electronic calculators and the developments now in view (CW, July 7). The obvious advantages of cheap, quick, convenient devices, with all sorts of gimmicky additions, carry the seeds of destruction for personal numeracy.

Mathematicians, engineers, statisticians, etc, use calculators as a tool, the same as writers use pens, typewriters, dictaphones and so on. The latter do not forget grammar or spelling; the former do not lose their basic understanding of the maths.

However, for most people — and I include most who use computers as opposed to building the hardware or software — the use of the calculator for all sums seems to be destroying the hard-won skills developed with great difficulty at school.

These skills are not just useful for examinations but give automatic understanding of major parts of our complex society. Innumeracy is at least as great a problem as illiteracy, but less noticeable.

Dr. Evans should, as a psychologist, be advocating urgent research into the deleterious effects of using calculators on ordinary people's perception of numbers.

Old people cannot understand kilos, pence and so on today. The next generation may have even greater difficulty understanding 2+2 without their personal black box to help.

R. G. HENNESSY
Woodley,
Berkshire.

The Editor welcomes letters commenting on subjects published in Computer Weekly, or on original topics. All letters must be accompanied by the writer's name and address, not necessarily for publication.

Appointments

LONDON Derek Blakemore 01-261 8454 · MANCHESTER Owen Kelly 061-872 4211 · BIRMINGHAM Alan Escott 021-356 4838 · GLASGOW Owen Kelly 061-872 4211 · BRISTOL Alan Escott 021-355 4838 · LONDON Steven Beeslingthwaite 01-261 8174 · MICHAEL WHITE Classified Advertisement Manager 01-261 8028/8658

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Applications should be sent to:
The President,
Abadan Institute of Technology,
Abadan, Iran.

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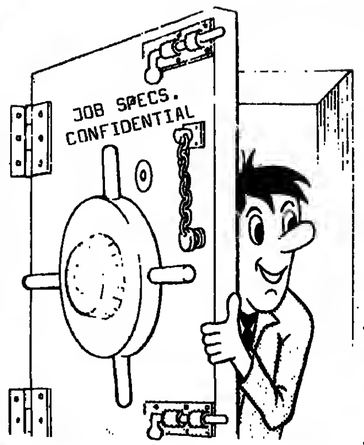

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JBA

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Training Officer

c £5000

Centre-file Limited, is a member of the National Westminster Bank Group and one of the largest Computer Bureaux in the country. We operate a wide range of real-time, batch and custom built services for, amongst others, stockbrokers, building societies and industrial and commercial organisations, many of whom are household names.

Currently we are looking for an experienced training professional to join our established Training Section, who would be able to contribute effectively in the development and presentation of the Company's training requirements, and the administration of the overall Company training objectives.

The ideal candidate should have had previous experience in the development and organisation of Computer Programmer and Operator training. As there is a continuous policy within the Company to train our own technical staff. They should also be able to show initiative and the ability to communicate with staff at all levels.

A starting salary in the region of £5000 is envisaged, together with an attractive range of fringe benefits, which includes a Company Pension Scheme and Preferential Loan Facilities.

Centre-file Limited

Please write with full career details to: Miss Atkinson, Personnel Department, Boundary House, 19-22 Furnival Street, London EC4O 1JU.

A member of the National Westminster Bank Group

PRESTON POLYTECHNIC

TEMPORARY LECTURER GRADE I OR GRADE II IN COMPUTER STUDIES OR PART-TIME LECTURERS IN COMPUTER STUDIES

The full-time appointment would be for one year from 1st September, 1977 to 31st August, 1978. Applicants would be expected to teach commercial data processing, and should be graduates with relevant practical experience.

Salary Scale: Lecturer I £2,813-£4,869 Lecturer II £3,744-£6,885

Applications will also be considered from prospective part-time lecturers in data processing who may be required for the academic year 1977-78.

Application forms and further particulars may be obtained from the Chief Administrative Officer (Staffing), Preston Polytechnic, Corporation Street, Preston PR1 2TQ. Closing date 26th August, 1977.

Britannia Building Society

2 SYSTEMS ANALYSTS

UP TO £4,500 + MORTGAGE

Come and join an organisation that is blazing a O.P. trail in a rapidly expanding industry

We have vacancies for two systems analysts to work at our Chief Office in rural North Staffordshire.

The Britannia is the ninth largest building society in the U.K. with assets exceeding £850m and a national network of 140 branches.

We operate a large ICL System 4-72 to provide a real-time video service for our administrative departments as well as a complete batch system covering 750,000 investment and mortgage accounts.

Our MIDAS project will shortly go live, bringing on-line passbook-updating terminals to our top 50 branches, using the latest modular terminals manufactured by Datasaab, the first such system installed by a national building society.

The ideal candidate will have:

★ At least two years O.P. experience including systems and programming
★ Knowledge of on-line systems
★ Experience of System 4 and Ilnentel systems

A salary in the range £3,500 to £4,500 p.a. is offered plus an annual bonus, concessionary mortgage scheme and other benefits; full details at interview.

Write for an application form to:

Mr. Ray G. Hewson,
Assistant General Manager (Personnel)
Britannia Building Society
P.O. Box No. 20
Newton House
Leek, Staffs. ST13 8RG

If you require more information, telephone Geoff Preston, Systems Manager, at Leek (0538) 385131.

Thinking of the benefits of working for a growing company? You must be thinking of Systime.

Systime is established as a major U.K. supplier of mini-computer based business systems. Its consistent growth enables the right people to extend their responsibilities, experience and earnings. Its consistent success ensures a working environment that is dynamic and exciting.

REGIONAL PROGRAMMING EXECUTIVES
to head up the Northern and Southern development teams from offices in LEEDS and WALLINGFORD respectively. These are management positions which carry responsibilities for staff development, staff allocation and quality control. Salaries will reflect the responsibilities and company cars are provided.
Applicants must have proven experience in project or programming management, possibly acquired with a software-house or manufacturer.

EUROPEAN SOFTWARE EXECUTIVE
to be based in the LEEDS or WALLINGFORD offices. Responsibilities will include the evaluation of customer requirements, software contract negotiation, the formation of project teams and subsequent project management for our rapidly expanding customer base in Europe.
Previous experience as a project leader in the development of commercial mini-computer systems is essential and a knowledge of French and/or German would be advantageous.

With our continuing U.K. expansion we require additional, experienced personnel in the following offices: LONDON, WALLINGFORD, LEEDS, MANCHESTER, LEICESTER, GLASGOW and DUBLIN.

PROJECT LEADERS
with proven ability to manage a commercial systems development team: mini-computer experience is preferable but not essential.

ANALYST/PROGRAMMERS
with a minimum of four years commercial systems and programming experience.

PROGRAMMERS
with commercial programming experience, preferably in a mini-computer or real-time systems environment.

We currently have personnel working on customer premises in HOLLAND, BELGIUM and WEST GERMANY. There is an immediate requirement to extend this support and we are particularly interested in personnel who join us in the UK with a view to subsequent assignments in Europe.

CONSULTANTS/SUPPORT SPECIALISTS
are required to join the Applications Support Department based in LEEDS. Their functions will include the development, marketing, implementation and technical support for commercial packages in one of the following areas:

Administrative Systems–personnel information, time recording and word processing.

Order Entry and Stock Control Systems–with the emphasis on retail and distribution operations.

Motor Dealer Systems–include finance and accounting, parts control and service warranty.

Program Development Aids–Software generally, though not exclusively, written by Systime to assist customer program development.

All four positions afford the opportunity to head up a section and require personnel with previous project leadership experience, preferably on mini-computer or real-time systems.

Write giving career details, to D.H. Montgomery, Systems Director, Systime Limited, Concourse Computer Centre, 432 Dewsbury Road, Leeds LS11 7DF or phone the Systems Secretary on Leeds (0532) 707411 for an application form.

SYSTIME
REAL-TIME COMPUTER SYSTEMS

PROBLEM SOLVER

Up to £4,500

Based Hemel Hempstead

Oxion Limited, the leader in storage and materials handling equipment, require a Problem Solver to maintain and develop their work on design, pricing, engineering and drafting by using mini computers.

The successful man or woman should have one to two years' experience of programming in any high level language on mini computers. Knowledge of assembly language would be useful. In addition, the successful applicant should have sufficient technical knowledge to learn Oxion design techniques.

This is a key job in which the job holder will have a significant impact on the company's efficiency and profitability.

Oxion Limited is a member of Oxion Comino International Limited, and conditions of employment are those expected from an international organisation.

Please write, giving full details of your career to date, to: David Adams, Personnel Manager, Oxion Limited, Oxion House, Empire Way, Wembley Park, Middx.

OXION

PC

A MEMBER OF THE BUSTON GROUP

We have installed a brand new Univac 90/80 at our London Data Centre in Hammersmith. It will be supporting a major on-line system and we need to supplement our existing operations staff to cope with this extra workload. Candidates should have the ability to maximise throughput in a busy multi-processing environment and be able to communicate with staff at all levels.

SHIFT LEADER to £4,750 Inc.
As shift leader you will have had a good Univac 9000/series 90 or IBM 3807370 background. You must be at least S/L or Snr. Op. level at present and be used to running a shift and carrying all the accompanying responsibility.

SNR. OPERATOR to £3,600 Inc.
You must have at least 2 yrs. Univac or IBM experience and be adaptable enough to learn all about our new equipment quickly. You will be expected to deputise for the S/L in his/her absence.

We operate a 3 shift system. Monday to Friday and you will receive all the benefits associated with a large group, including discounts and L.V.s.

Contact MARILYN DAVIDSON on 01-936 8776

Computer Personnel International

Computing Services Association

110 St. Martin's Lane, London, WC2N 4BH

occ computer personnel limited

Kent — rural location

The Data Centre of this international organisation provides development and processing facilities to group companies in the UK and Europe. Expansion in the work load of the group has led to the need for additional staff as described below.

The development staff are grouped into mixed teams of analysts and programmers — each responsible for new and existing systems on a continuous basis for the various group companies. The work is therefore a mixture of new development, trouble shooting, maintenance and enhancements. Financial and accounting applications form the bulk of the work.

IBM 370-OS Data Centre

Senior Programmers

to £5,200

OS COBOL required

Senior Programmers will join a project team and will design, write and implement programs and, on occasion, will supervise small teams of programmers. A minimum of three years' programming experience is needed with a minimum of one year's OS COBOL.
Ref: 244A/CW.

Good career prospects — generous relocation package

Programmers

£3,500+

COBOL on ANY Hardware required

Programmers with a minimum of one year's COBOL experience on ANY hardware are required. Full training will be given in IBM COBOL, JCL, etc.
Ref: 244B/CW.

The Data Centre is housed in superb offices in the country and working conditions are excellent. The atmosphere is relaxed and friendly although high standards of work are expected. Career prospects are very good — both at the Data Centre and possibly by transfer to other group companies worldwide. The fringe benefits include a very generous relocation package, flexitime working, subsidised canteen and good social and sports facilities. Reasonably priced housing is available within easy reach.

To apply for these positions, or for further information, please write or phone asking for Neville John. Day: 01-242 9386. Evenings: Farnborough, Kent (66) 52017. If you are interested but you are not sure if your experience is appropriate, please ring for an informal discussion or interview.

Interviews outside normal office hours can be arranged if more convenient.

Members of Computing Services Association

Anglian Water Authority

NEW INSTALLATION NEW OPPORTUNITIES

[illegible]

TECHNICAL SUPPORT GROUP

PROJECT LEADER— DATA COMMUNICATIONS

Ref: RP 20 c£7,300

To be responsible for

- [illegible]
- [illegible]
- [illegible] procedures
- [illegible]

In addition to a wide general experience of computers, applicants should.

- [illegible] with the implementation of [illegible] communications system
- [illegible]

SENIOR SYSTEMS PROGRAMMERS

Ref: RP 20 c£6,000

To assist in.

- [illegible] the Authority's [illegible]
- [illegible] to support [illegible]

[illegible]

BUSINESS SYSTEMS GROUP

PROGRAMMING TEAM LEADER SENIOR PROGRAMMERS PROGRAMMERS

Ref: [illegible] Salary up to £5,000

[illegible]

Generous relocation expenses are payable in appropriate cases for all posts.

Application Forms (returnable by 28th August, 1977) are obtainable from the address below or by telephoning (0480) 00181 ext. 262.

PERSONNEL DEPARTMENT
ANGLIAN WATER AUTHORITY
DIPLOMA HOUSE, GRAMMAR SCHOOL WALK,
HUNTINGDON. CAMBS. PE18 6NZ.

WORK WHERE YOU WOULD NORMALLY HOLIDAY!

SYSTEMS PROGRAMMER **SALARY c £5,500**

We are retained to recruit a Data Processing Professional for our Clients, a major International Manufacturing and Marketing Organisation. They are based in rural countryside, close to the Scottish lochs, and offering a wide range of recreational facilities.

They are looking for an experienced Systems Programmer with a minimum of 2 years' experience of OS/VS software, and a knowledge of VS1 is particularly advantageous. They currently have IBM 370/145 hardware being upgraded to a 148 later this year. RJE facilities are being utilised, and they are implementing IMS, DC and DB.

The successful candidate will enjoy excellent terms and conditions of employment with this secure, rapidly expanding organisation.

Full relocation expenses will be paid.

Initial interviews will be held in Manchester, Birmingham, London and Glasgow.

CONTACT:

DAVID WADE on: 061-833 0676

REF: 77/08/11

BRISTOL

SYSTEMS CONSULTANT

SALARY CIRCA £5,000 P.A. PLUS PROFIT SHARE, PLUS COMPANY CAR

We are to recruit a further Systems Consultant for a well-established, respected computer services company to work at a senior level and in an advisory capacity to users and potential users of the company's on-line commercial business systems.

Candidates must have:—

- a sound understanding of commercial business systems
- a strong mainframe computer background to include a current programming understanding ideally, of ICL 1900 series PLAN
- be capable of customer contact and of representing the company as a Senior Technical Specialist.

This is an attractive well-paid post within a professional and dynamic privately owned computer services company, with further considerable opportunity for real career progression.

Company benefits are well above average and include a company car and profit share.

FOR FURTHER INFORMATION REGARDING THIS POSITION PLEASE CONTACT WITHOUT DELAY: REG HEATH ON 021-236 3781.

REF. NO. 77/8/12

LONDON & MANCHESTER

(UK-wide territories)

SENIOR SALESMEN

(MINI COMPUTERS)

quota earnings: 13K+. + car

Our Client is an International US controlled mini computer supplier, well established in the UK. Its hardware and software are amongst the most advanced, exciting and powerful in the market place.

The UK sales force operates on a vocational basis.

Specifically candidates must:

- have a good understanding of the MEASUREMENTS & COMMUNICATIONS markets
- be able to demonstrate a solid, successful sales track record in at least one of these markets
- be high earners, well-motivated and with a professional attitude to selling
- be aged 27/40

CONTACT:

PETER RIGBY on: 021-236 3781

REF: 77/08/13

SCR

SPECIALIST COMPUTER RECRUITMENT LTD.

BIRMINGHAM 021-236 3781 FREEPOST
Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR

MANCHESTER 061-833 0676 FREEPOST
Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 3BD

LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102, Blandford Street, London W1E 1JZ

Computing Services Association

Trinidad and Tobago nationals with Data Processing experience

Colonial Life Insurance Company (Trinidad) Limited is one of the leading life insurance companies in the Caribbean. They are expanding their data processing facilities and require:

Programmer Analysts and Programmers

You should have the following qualifications and experience:
* Five GCE 'O' Level passes with two at 'A' Level, or equivalent.
* Formal training in systems and programming.
* A minimum of three years' in systems and programming. Knowledge of RPG 2 and life insurance experience would be an advantage but are not essential.

Applications, giving full career details plus contact address and telephone number, should be sent as soon as possible to:
Box No. CW1480,
Mathers & Bensons Advertising Limited,
Chancery House, Chancery Lane,
London WC2A 1QU.

Greater Glasgow Health Board

INTERMEDIATE SYSTEMS DESIGNER

Salary Scale: £4006-£4983 + £520 flat rate supplements

Applications are invited for the above post within the Board's Computer Applications Unit. Candidates should have a good knowledge of systems design and the ability to supervise staff working in FORTRAN/PLAN.

Application form and further details may be obtained from the Personnel Officer, Greater Glasgow Health Board, 351 Sauchiehall Street, Glasgow G2 3HT, to whom completed forms should be returned by Wednesday, 31 August.

UNIVERSITY OF ESSEX

RESEARCH OFFICER IN THE DEPARTMENT OF SOCIOLOGY

Applications are invited for a one year post of Research Officer (Range 1B) salary scale £2904-£3333, for analysis of occupational biographies by computer simulation. Familiarity with computer techniques essential.

Applications (three copies, quoting ref. CS/88/CW), including a curriculum vitae and the names and addresses of two referees, should be sent to the Registrar (CS/88/CW), University of Essex, Wivenhoe Park, Colchester CO4 3SQ, from whom further particulars are available by 24th August, 1977.

SYSTEMS PROJECT MANAGERS Up to £7,000

SENIOR SYSTEMS ANALYSTS Up to £6,000

SYSTEMS ANALYSTS Up to £5,500

PROGRAMMERS Up to £4,500

N. SURREY & CITY

International organisations with large mainframe installations are seeking experienced people for the above positions. If you feel you have suitable experience for any of the above posts please contact us

PROGRAMMERS Up to £5,[illegible]

N.W. LONDON

COBOL, ASSEMBLER or RPG II Programmers with [illegible] years' commercial experience are required initially [illegible] staff with potential to progress to systems. The positions [illegible] suit those with a flair for meeting people and the [illegible] progress through systems into management.

Please phone for an Application Form.

AMES PERSONNEL

TELEPHONE: 01-767 0611

A Future in Computers

Sales Executives

Area Support Specialists

Product Specialists

Based at Slough, the International division of this very successful mini computer vendor has immediate vacancies for experienced Sales Executives, Area Support Specialists and Products Support Specialists to market and support its products in areas of Western Europe, the Middle East and Africa, where the Company is actively establishing its presence.

These are challenging positions requiring a high degree of personal initiative and drive, sound technical knowledge and the aptitude and resilience to operate successfully in international markets.

These positions are UK based and require extensive travelling. Opportunities could arise for successful salesmen/women to relocate overseas if desired.

Only experienced and successful mini computer salesmen/women need apply. Although international experience is not mandatory it would be a strong asset.

Remuneration would be high and on-quota earnings would not be lower than £12,000 for the right applicant.

Contact Mario Guzzetti — Sales Manager.

c£12,000

An Area Support Specialist is responsible for technical support in a designated group of countries, therefore overseas travel on short term assignments will be involved. He or she provides liaison and high level support from the International Headquarters in the UK to the local support groups.

The position calls for the ability to handle large projects, formulate proposals, run benchmarks, make technical presentations on our software products, and involves all pre and post sales support.

The Company operates in both the Commercial and Scientific markets and Area Specialists must build an all round knowledge of the Company business areas and products.

Candidates should have at least 5 years D.P. experience with mainframe and/or mini computers, with ideally a knowledge of COBOL, FORTRAN and ASSEMBLER.

Contact Keith Hobson — Sales Support Manager.

£5-7,000

+ Car Allowance

Product Specialists provide detailed support in their own special subjects for the International area. They are the experts for proposals, installations and problem solving.

Experience on either mainframe or mini computer systems in the following areas is desired:—

- Communications software
- Transaction processing systems
- Database systems
- COBOL (different implementations)
- Operating systems.

These are ideal opportunities for persons who wish to specialize, while retaining the benefits of travel and a wide variety of projects.

Contact Keith Hobson — Sales Support Manager.

£5-7,000

+ Car Allowance

INTERDATA

A UNIT OF PERKIN-ELMER DATA SYSTEMS

Interdata House, 227 Bath Road, Slough SL1 4AX, Berkshire, England.
Telephone: Uxbridge 62441

JBA

Technical Author

Berkshire — c. £6000

An international consultancy have a vacancy for an experienced applications software author. The successful appointee will enter a team environment, will be a self-starting, flexible individual with the ability to write clear and concise procedural descriptions. Senior programmers or analysts who can demonstrate a background of self-documented work will be considered.
Excellent fringe benefits are offered.

Contact: Mike Creamer

Technical Authors & Engineers

Home Counties/South — up to £5500

A number of our clients are urgently seeking experienced authors (in some cases graduate trainee authors) to carry out documentation work on a variety of technical computer based systems, or commercial systems (with hardware or software bias). Experienced Computer Engineers, in field support or instructional areas are also sought.
Excellent staff benefits and prospects.

Contact: Mike Creamer

COBOL/PLAN Programmers

Middlesex — up to £4500

A large international manufacturing company are seeking COBOL and/or PLAN programmers with at least 1 year's experience in industry. Recognised large main frame experience is ideal; applicants interested in rapid promotional prospects preferable.
Attractive company benefits and generous relocation package offered.

Contact: Mike Creamer

Instructor

Herts. — Neg. c. £6000

Our client, a progressive and expanding mini computer manufacturer, requires an instructor to provide training courses in the application of computers to business systems.
The successful individual will have considerable experience of business orientated applications including the development of accountancy systems. Additional knowledge in the stock/production control areas would be an advantage. Previous instructing experience is obviously desirable but candidates with the potential, enthusiasm and flexibility of approach to training will be considered.
Excellent opportunity for career advancement

Contact: Margaret Stevens

FORTRAN/RSX11 Programmer

London — c. £5000

Our client, an international organisation, has a vacancy for a software specialist to work on new systems in the commercial area. Applicants must have several years experience in d.p. and be competent in FORTRAN using RSX11. A commercial or communications background would be preferred. This is an exciting opportunity to join a large well-known company.
Salaries negotiable. Excellent fringe benefits.

Contact: Margaret Stevens

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

JAMES BAKER ASSOCIATES
International Personnel Consultants
16 Maddox Street, London W.1. Tel: 01-491 4478

APPOINTMENTS

CPC wish to establish a Central Register of Computer Professionals who are seeking career development.

All applicants will be fully interviewed and councilled before admission to the register. Efforts will be made to carry out discussions locally.

If you are approximately aged between 23 and 30, have at least two years' experience in a major computing discipline and are either actively considering a change of position or alternatively feel you would benefit from confidential career councilling, we would like to hear from you.

In the first instance please write to me, Patrick Convey, at the address below, giving brief details of your circumstances, experience and career aims. Please also give a telephone number and times at which you may be contacted.

CAREER COUNSELLORS TO COMPUTER PERSONNEL

CPC

COMPUTER PERSONNEL CONSULTANTS
4th FLOOR, THE ROTUNDA
BIRMINGHAM B2 4PA
Tel. 021-632 8848

EDUCATION DEPARTMENT

LECTURER GRADE I (£2,913-£4,869)

MONKWEARMOUTH COLLEGE OF FURTHER EDUCATION
DEPARTMENT OF SCIENCE AND TECHNOLOGY

Applications are invited for the post of LECTURER in COMPUTING AND DATA PROCESSING, with the ability to teach Mathematics to G.C.E. 'O' level, if required.

Applicants should possess at least Part I membership of the British Computer Society or equivalent qualifications, together with a suitable qualification in Mathematics. Previous teaching experience an advantage.

Application forms and further particulars available upon receipt of a stamped, addressed envelope from the Principal, Monkwearmouth College of Further Education, Swan Street, Sunderland SR5 1EB

Closing date for applications: 22nd August, 1977.

L. BLOOM
Chief Executive

Borough of Sunderland

UNIVERSITY OF ABERDEEN
COMPUTING CENTRE

Systems Programmer

Applications are invited from candidates having an honours degree in Computing Science, Mathematics or a Science subject and also having at least three years' programming experience. In addition to two high level languages applicants must have programmed in an Assembly language and preferably have some experience of systems programming on a modern computing system.

Staff appointed will work on a new multi processor Honeywell 66/60 system.

Salary on scale £3,333-£6,627 with appropriate initial placing.

Further particulars from The Secretary, The University, Aberdeen, with whom applications (2 copies) should be lodged by 2 September, 1977.

PLYMOUTH POLYTECHNIC
COMPUTER CENTRE

PROGRAMMER

Salary: £2,922-£4,098
(+£312 p.a. supplement)

To contribute to student service work, developments on MAXIMOP, and the writing of programs for a wide range of scientific and administrative systems for both 2903 and 1903A.

Good working knowledge of FORTRAN/COBOL and experience with GEORGE 2 and/or MAXIMOP would be advantageous.

Application forms, to be returned by 2nd September, 1977, can be obtained with further particulars from the Personnel Officer.

PLYMOUTH POLYTECHNIC, DRAKE CIRCUS
PLYMOUTH PL4 8AA

CONTRACT - NORWICH

Assembler DOS/CICS/VS
(3 months initially).

Phone (0603) 887233
any time up to 9 p.m.

Fortran, Coral, Algol or Assembler. If you talk our language why not join our team? We develop and supply some of the most advanced airborne electronic systems in the world. If you want to be a part of our future write to: T. Jones, Marconi Elliott Avionic Systems Ltd., Airport Works, Rochester, Kent. Tel Medway (0634) 44401. Ext. 61

FREELANCE

CONTRACT
PROGS AND
ANALYSTS
required
now and September
STARTS
CSC 789 3144

CAPITAL APPTS.

COMPUTER
SERVICE
ENGINEERS

SALARIES TO £6000

637 8851 day; 445 [illegible]

Computer Engineers

for a new in-house maintenance activity - London, SW3.

Comshare – the most dynamic timesharing business in the UK and part of an international group is growing so fast we must have our own hardware maintenance service. We can't afford downtime.

We're looking for engineers highly experienced in this field to be based at our Chelsea Computer Centre. They have to be tops at fault finding and fixing. But the rewards will match their skills.

Our systems run on XEROX SIGMA 9 mainframes with AMPEX memory, CDC 86M8 disc drives, POTTER tape drives and DATA PRODUCTS printers.

In addition to maintenance, they will be involved in installation and commissioning of new equipment in liaison with suppliers and also collaborate closely with Comshare's R & D Group in America.

These new opportunities offer career advancement to man or woman in a fast-moving activity, where exciting plans are shaping for further expansion and state of the art upgrades to the present configurations.

Senior Engineer	up to £8000
Engineer	up to £7000
Peripheral Engineer	up to £6000

Ideally all the above should be qualified up to HND (Elec. Eng.) and preferably have XEROX-SIGMA 9 experience.

also

Trainee Engineers — up to £5000

with an electronics background, we will help you through an official Honeywell Xerox training course.

The salaries will be supplemented by attractive overtime payments, Company car, BUPA, pension scheme, etc. plus generous relocation assistance as necessary.

These jobs will fill quickly. So if you're keen to join a young and enthusiastic team, don't hesitate – telephone Graham Pudif now on 01-351 1251 for details or write to:

Computer Engineering Manager, Comshare Limited, P.O. Box 197 London SW3 5RL

OFFICES IN LONDON, ABERDEEN, BIRMINGHAM, BRISTOL, GLASGOW, LEICESTER, WAKEFIELD, WARRINGTON, WASHINGTON, WINCHESTER AND WORLD-WIDE

COMSHARE
making the computer make sense

Why are CMG always advertising for staff?

The computer services market in the UK and the rest of Western Europe is growing at between 25% and 40% a year.
This is what is actually sold and not what could be sold if more resources were available.
The growth of CMG since its formation in 1964 has been substantial – Turnover during 1975/1976 was £5.4 millions.
To sustain our rate of expansion which is in line with market growth we will require at least thirty more people in our UK branches during 1977.

What's so special about CMG?

We are a young company committed to:-

- Building a successful company, wholly owned by those working in it, where each person could "be his/her own boss," to the maximum possible extent.
- Paying high salaries, providing top conditions, and pension arrangements in order to attract the best people in the industry, in return for hard work and maximum opportunity.
- Organising the company in small manageable groups and units, where everyone can know everyone else, with maximum delegation of responsibility.
- To making all management appointments from within.
- Making all information about the company available to everyone, with no exceptions.
- Involving every member of the company in the decision making process through regular staff, management and policy forming meetings.
- Sharing profits, and enabling all staff to buy shares in the company.

What vacancies are currently available?

Systems and Programming Consultants

at CMG Middlesex at CMG West End
at CMG City and at CMG Southern

£4000 to £6000 £6000 to £8000
£8000 to £10,000

Operators

at CMG (UK) Ltd.,

£3000 to £5000

What exactly is a Systems and Programming Consultant?

Depending upon the requirements of the project to which they are assigned, our staff may be called upon to use any or all of their programming, systems, management and general consultancy skills. We do not separate programming from systems work as far as job functions are concerned.

Whilst at times people will use their experience of specific machines, languages, and applications they will also be required to draw upon their general computing experience and learn new specific skills with the assistance of other experienced CMG personnel. We therefore require people whose prime interest is in developing systems and solving business problems rather than working with specific equipment.

The main job satisfaction is gained from getting work ready within agreed cost and time scales. There is a considerable amount of customer involvement and everyone is expected to participate in the sales effort of the company. People are given all the responsibility that they can handle and there are unrivalled opportunities for promotion, all of which is from within CMG.

We require a minimum of two years programming experience. Experience on any commercial machines is considered relevant with experience of both mainframes and mini's being preferred. Similarly the particular languages used are not important but we prefer a knowledge of both high-level and low-level languages, with COBOL and any Assembler language being the most desirable.

Experience of project leading, customer involvement, management responsibility and sales involvement are not essential for all vacancies but some or all of this type of experience would be required for the more senior positions.

We require experience with commercial and financial applications with general accounting knowledge being the most useful.

What experience is necessary for a CMG Operator?

At least three years' practical experience is essential with a knowledge of more than one type of computer being most useful.

Preferably, you will have some experience of the responsibilities of working at a senior level.

The ability to work with the minimum of supervision is a basic requirement of our Operations Staff.

The work will involve responsibility for optimising throughput and quality of the work produced on our Burroughs and Honeywell machines.

Where do I apply?

Please write or telephone for an application form quoting ref: CW/28 to:

Ann Baird,
CMG (City of London) Limited,
Eastgate, 73 Leman Street, London, E1 8EY
Tel: 01-481 3861

OR
Jane Loiper,
CMG Computer Management Group (Middlesex) Limited,
Westway House, 320 Ruislip Road East,
Greenford, Middlesex UB6 9BW.
Tel: 01-578 4563

OR
Janet Gothard,
CMG (West End) Limited,
Sunley House, Bedford Park,
Croydon, CR0 2AP
Tel: 01-686 8251
(To be relocated in London)

OR
Bobby Rogers,
CMG Computer Management Group (UK) Limited,
Sunley House, Bedford Park,
Croydon, CR0 2AP.
Tel: 01-681 7631

OR
Barbara Clark,
CMG Computer Management Group (Southern) Limited, Sunley House,
Bedford Park, Croydon, CR0 2AP.
Tel: 01-688 8251

CMG
London · Amsterdam · Frankfurt
Rotterdam · Brussels · Glasgow

MINI ANALYST/PROGRAMMERS

N. EUROPE

The Company:

Is a large international Consultancy and Systems Implementation group. In keeping with its prestigious reputation it urgently requires top calibre personnal to implemant its rapid expansion programme and has retained Informatix to assist with their personnal requirements.

Technical requirements:

A. Senior Analyst/Progrommers having not less than 4 years' experiaace of design and implementation of Mini Computer systems for on-line and/or real-time applications involving Assembler level Programming in a Mini Computer environment.

B. Analyst/Programmers having not less than 2 years' experience of Assembler Programming relating to Mini Computer applications.

Prerequisites:

Ideally candidates should have a professional qualification or a degree equivalent preferably related to Computer Science, Mathematics, Science or related areas. Significent D.P. experience may be accaptable in lieu of the aforamantioned requirements.

SALARIES COMPRISE: Cost-of-Living Allowance Plus Base U.K. Salary to £10,000++ 7½% Holiday Bonus

The Prospects:

In addition to excellent salaries successful candidates will meet with technically rewarding projects and rapid advancement career prospects are open to those whose contribution enhance the prestige reputation and expertise of this group — a world leader in 'State-of-the-Art' systems implamantation.

The Remuneration:

Generous relocation allowances will be paid to candidates and their families. Four weeks' paid annual holiday plus 7½% holiday bonus is payable in addition to salaries adjusted upwards to meet cost-of-living differentials. Temporary accommodation will be provided at the outset pending location of permanent accommodation.

Interviews:

To be held in London throughout the month of August. It is anticipated that employment offers will be made to successful candidates within 10 days of interview.

Ref. 36/1

informatix

Telephone 01-491 4636

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Avon House, 360-366 Oxford Street, London W1N 9HA.
(Opposite Bond Street underground)
Telex: 28800 ALPRESS LDN.

Computor Operator

c.£3000+25% shift allowance.

We operate on IBM 370/145 under OS/VS1 supporting batch and on-line applications. In addition there is a 370/148 scheduled for delivery in early November.

Because of this expansion we need another Computer Operator, who has at least one year's experience with OS/VS1.

A three-shift system is worked with weekend overtime as required. Working conditions and fringe benefits are excellent and relocation assistance is available if necessary.

For an application form ring Liz Gibney on Swindon (0793) 27812. (24 hour answering service).

Hambro Life Assurance
Hambro Life House
Station Road, Swindon SN1 1EL

SOCIAL AND COMMUNITY PLANNING RESEARCH

PROGRAMMER

£4,500 +

SCPR, an independant research institute, require an experienced programmer to join a small team concerned with the computer analysis of surveys. Responsibilities include planning and executing the computing phase of a number of individual research projects. Good self-organisation is essential.

Experience of survey analysis would be an advantage but this is not essential provided willingness and ability to adapt to this application can be shown. Specialised packages are used for most functions but Fortran experience would be useful. Bureau computers are used.

A distinctive feature of the job is close liaison with the senior (non-technical) staff who design research and interpret its results/ability to communicate well is therefore essential.

Benefits include a 9-day working fortnight and 4 weeks' annual holiday.

Apply in writing, giving full details of education, experience and current position, to:

Stephen Elder, Technical Director
Social and Community Planning Research
18 Duncan Terrace, London N1 8BZ

OPERATIONS MANAGER/ESS

The Yeast and Food Division of THE DISTILLERS COMPANY LIMITED operates a 36K 2903 with 3 EOS 30 disk drives, 2 tape decks, card reader, line printer, 7502 Modular Terminal Processor and 8 Vidao Terminals

An OPERATIONS MANAGER/ESS is now required to assume control of all aspects of Operating, Data Control and Data Preparation, with a staff of 17. The person appointed should have a mature personality, sound knowledge of 2903 operating and utilities, wide data control experience, and a capacity for hard work. Applicants must be willing and capable of assuming full managerial responsibility, yet maintain a flexible approach concerning their own daily activity.

In addition to a salary of £5,000 we offer luncheon vouchers, four weeks' holiday per year, non-contributory pension scheme and removal expenses, if necessary.

Please apply to: Mrs. J. Clay, Personnel Officer, **The Distillers Company Limited, Yeast & Food Division, Crown House, Mordott, Surrey. Tel. 01-542 6855.**

CAREER OPPORTUNITIES IN NEW SERVICES COMPANY

Birmingham based — 1900 Hardware — Salaries c £5000+

The Company is a newly formed indapendant mamber of a large National Group, servicing the group's computing needs. So thay can offar stability and security, along with the challenge of producing top quality work to an agraad timetable. The company's services are provided from a number of computer cantres in the UK, of which the Birmingham cantra is the largest, using an ICL 1903T with talaprocessing links. The company is actively marketing its services, and has nead of top quality davelopment staff. Tha vacancies all carry good benefits, and offar axceptional potantial, as new advancad hardware is plannad for tha future. As tha team is compact, these positions offar individuals the chanca to maka their mark on the company end to assist in the growth. Thay are all senior appointments, and the positions are as follows:

CHIEF PROGRAMMER

You will hava 1900 COBOL experianca, and ba capable of running a team of savaral programmars. It is a manegement position, raporting diractly to the Development Manager, and offara scopa to bring high standards to tha team. You will ba responsible for allocation of work, standard of programming, implamantation, progress reporting and close liaison with Production Management. Recruitment of new staff and thair training and progression will also be part of this job.

SYSTEMS PROGRAMMER

Evidance of systams programming experiance, including both high and low level languages, not necessarily ICL, is required. Driver, COMMS Manager, George 2 Plus and Maximop ara all in use, and would bacoma your rasponsibility. You would take control of all operationa softwara, and advise on upgrades and new facilities. This is an intarasting and challenging position, reporting to the Production Manager, and the futura possibilitias with hardwara/softwara davalopmants are most exciting.

SENIOR ANALYSTS

Because tha Company haa to sell its sarvices to ita clients, tha ability to deal with them in a professional mannar is required. You will be expected to carry out faasibility studias, investigations, daaign and implementation. The application areas, in addition to the normal commercial systams, include advanced specialised davelopmants closaly meeting tha apecific business naads of tha company's cliants.

It is a project leading rola, reporting diract to the Davelopment Manager, and experience of scheduling and staff control would be usaful. One post may ba available at a mora junior laval.

Please contact Mike Hession (Ref. CW17) for a confidential discussion and appointment to your convenience

COMPUTER PERSONNEL CONSULTANTS 021-632 6848 (24 HR.)

4th Floor, The Rotunda, New Street, Birmingham B2 4PA

CPC
COMPUTER PERSONNEL CONSULTANTS

COBOL PL/I or BAL PROGRAMMERS & ANALYSTS

CENTRAL LONDON & S.W. ESSEX

3½% MORTGAGE
GRADE 1 £5,500-£6,750
GRADE 2 £4,500-£5,500

A well established Financial Institution based in London with RJE facilities in S.W. Essex is seeking to recruit a number of experianced Analysts and COBOL/PL/I or BAL Applications and Systems Programmers with strong OS backgrounds. A minimum of 2 years' programming experience is essential and ideally exposure to either 370/135, 145, 155 or 158 would be advantageous.

A strong background in Commercial batch processing is essential, whilst any on-line (CICS, IMS, etc) experience and data-base design would be desirable however, if necessary, training will be given in these areas. Successful candidates are likely to be able to demonstrate a strong flair for professionally documented programming procedures and senior applicants will have an in-depth knowledge of IBM utilities and JCL.

These appointments will appeal to candidates desiring to develop into on-line applications with the added benefit of subsidised mortgage. Flexible working hours and other good fringe benefits are added attractions.

Interviews will be held in London throughout August and early offers will be made to successful candidates.

Ref: 36/2

informatix

Telephone: 01-491 4636 until 7 pm

ANALYSTS + PROGRAMMERS

LONDON AND OVERSEAS — GRADE 1 £5,500-£6,750

SALARY TO £7000+
Per Diam Allowance

An established U.K. Software House with extensive overseas operations is planning a major expension programme and requires a number of Systems Analysts at various levels as well as experienced programmers.

Ideally candidates shall have solid IBM OS backgrounds and programmers will demonstrate experience in ANS COBOL (BAL would be an additional asset). In addition any experience within a Mini computer environment would be considered an advantage. In-depth exposure to OS JCL and Utilities is a prerequisite.

These positions will appeal to applicants free to travel extensively overseas and to a lesser degree to the U.K. very generous allowances will be paid during such periods. These positions are permanent and pensionable and candidates seeking long term career advancement will find considerable scope and opportunity within this progressive company.

Interviews will be held in London throughout August and offers will be made to successful candidates within 1 week of interview.

Ref: 36/1

informatix

Avon House, 360-366 Oxford Street, London W1N 9HA
(Opposite Bond Street underground)
Telex: 28800 ALPRESS LDN.

LINSCOTT COMPUTER SYSTEMS LIMITED

CV's To: P.O. Box 74 Brentwood Essex CM15 0BZ
Tel: 0277 212021

IBM SYSTEM 3 RPG II	ICL 1900/2903 COBOL and PLAN EXEC + GII	B1700 TO 6700 COBOL MCP	IBM SYSTEM 32 RPG 11 DISTRIBUTED DP
IBM 370 COBOL DOS + OS CICS	IBM 370 ASSEMBLER OS	U1100 COBOL EXEC 8	H6000 COBOL GCOS IDS
PDP BASIC + RSTS/E			ICL SYSTEM 4 USERCODE
MICROS ASSEMBLER PL1 COMMUNICATIONS	MINI/MICROs ASSEMBLER CORAL RTL2	PDP 11/70 MACRO 11 RSX 11	CORAL COMPILER WRITERS

CONTRACT

LINSCOTT PROVIDE HIGH SALARIES WITH PROMPT PAYMENT, TAX ADVICE, LOW COST COMPANY FORMATION AND LAST BUT NOT LEAST, STRAIGHT FORWARD ANSWERS. WHY NOT TELEPHONE US NOW TO ARRANGE YOUR NEXT, OR FIRST, CONTRACT

? WHY WAIT ? PHONE NOW!

SENIOR SALES REPRESENTATIVE

We are Raytheon - manufacturers of computers, distributed processing and terminal oriented data communication systems for Airlines and Industry. Raytheon International Data Systems is responsible for the marketing, sales and service of its products in Europe, the Middle East, Far East and Africa. The Raytheon terminal systems are installed with over more than 80 airlines.

We are seeking a Senior Sales Representative who will be responsible for the sales and marketing of "Raycheck" - the new Departure Control System developed by Raytheon in close co-operation with leading airlines and airport authorities.

The person whom we are seeking should have at least 5 years experience in marketing with the Management Services (D.P.) department of a major airline, or in selling of data-processing equipment to airlines and airport authorities. He should be in the possession of a Bachelors Degree in electronics and should reside in Holland.

He will report to the Sales Manager and will be supported by a good team of qualified System Engineers at the Headquarters in Amsterdam. English is the working language.

To the right applicant we offer an excellent salary and working conditions. For any further information, please write to: Raytheon International Data Systems, for the attention of Mr. J.O. Verschuur, 53 Spaklerweg Amsterdam, The Netherlands.

RAYTHEON

Raytheon International Data Systems, 53 Spaklerweg, Amsterdam, The Netherlands.

HAYWARDS HEATH SUSSEX

COBOL PROGRAMMERS

SYSTEMS ANALYST/DESIGNERS

to £5,000 p.a.

Our client is a Company within a large profitable group with long experience in data processing.
Applications are general commercial running batch and on-line with some teleprocessing.

Experienced COBOL programmers and Analyst/Designers are required to join a team recently relocated to Haywards Heath. The modern offices are conveniently located close to the railway station which offers frequent fast services to London and Brighton.

tap — Time and People Limited — Tel: 01-836 0355

Brettenham House Lancaster Place London WC2E 7EN

URGENT call us today

Computer Auditor

Salary up to £7,000

We are looking for a Computer Auditor who is able to make an immediate contribution to the Audit of both current computer systems and major systems developments.
Our Computer Auditor may well have a recognised accountancy qualification and will certainly have relevant experience in the D.P. Audit field. The job demands a self-starter who is capable of working with the minimum of supervision.
Initially the job will be based in London but will move to Chatham late 1978 on completion of our new administrative building.

Salary in the £6,000 -£7,000 range. Fringe benefits are excellent and include a non-contractual annual bonus, non-contributory pension scheme and life assurance cover.
Assistance will be given with relocation costs where appropriate.
Applicants should send details of career to date to:
H. F. Hughes,
Personnel Manager,
Corporation of Lloyd's,
Lime Street,
London, EC3M 7HA.
01-623 7100 Ext. 2550

LLOYD'S OF LONDON

WORCESTERSHIRE

SYSTEMS AND PROGRAMMING OPPORTUNITIES

SALARY UP TO £5,500 P.A.

We have been retained to recruit Systems Analysts and Programmers for our client, a manufacturing based organisation and a market leader in its particular field. Based around sophisticated ICL equipment, their systems development plans are both ambitious and technically advanced and they are utilising COMMUNICATIONS MANAGER for their on-line systems development plans, which include a network of terminal links throughout the UK.

SYSTEMS ANALYSTS

Candidates should have:—

- ★ a minimum of four years' data processing experience in a commercial manufacturing environment
- ★ taken at least one major system from design through to implementation
- ★ a minimum of two years' systems experience in an ICL environment
- ★ ideally, a programming background and experience of communication techniques

PROGRAMMERS

Candidates should have:—

- ★ a minimum of two years' ICL COBOL/PLAN experience
- ★ a desire to continue in the programming field using advanced techniques with the capability of understanding and applying such
- ★ experience of GEORGE III operating system is desirable but not essential

★ Age range of between 24 and 32 and be educated to degree level

Successful candidates will be given excellent working conditions, experience of the very latest computing techniques and relocation assistance, if necessary, to an area of low cost housing.

REF NO 77/08/6

021-236 3781

CONTACT CATHY TRACEY

SCR

SPECIALIST COMPUTER RECRUITMENT LTD.
BIRMINGHAM 021-236 3781 FREEPOST
Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR
MANCHESTER 061-833 0676 FREEPOST
Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 6BD
LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102, Blandford Street, London W1E 1JZ

Computing Services Association

Edmund Howard's Client Album

TEST PROGRAMMERS — HERTFORDSHIRE — SALARY C. £5,000

Experienced programmers are required to work in the Product Test department of our Client's Software Development Headquarters. Main responsibilities will include developing tests and conducting trials of newly developed software prior to general release. The ability to write comprehensive reports and negotiate test objectives is essential.

Candidates should possess a practical approach to problem solving and an appreciation of the eventual users requirements which should reflect in the completed product. Rapid career advancement is envisaged for those with relevant experience wishing to capitalise on their present expertise. For further details please quote CW149.

DEVELOPMENT PROGRAMMERS — HERTFORDSHIRE — SALARY UP TO £6,000

One of the world's leading computer manufacturers is currently recruiting experienced programmers to work on the development of new products within their European Software Development Group. Candidates' experience should stem from a computer manufacturing background with a strong bias towards assembly level programming. A working knowledge of Disc based systems plus some communications experience would be a decided advantage.
This is a unique opportunity to join a rapidly expanding department where you can develop your talents to the limit. Career prospects are excellent within the department. For further details please quote CW149.

SOFTWARE CONSULTANTS (1903 going to 2960) — ESSEX — C. £6,000

A leading manufacturer of precision engineering products is currently seeking a software specialist with at least five years' experience in systems programming.
The person appointed will report to the C.S.M. and be responsible for software evaluation, software planning and maintenance and also the training of systems and programming staff in current software developments.
The company has plans to develop extensive real-time systems for its commercial and manufacturing activities. An ICL 2960 will be installed in a new computer suite towards the end of 1978 to support these developments and will utilise VME/B TPS 1900 and DME.
Current systems are based on an ICL 1903A running under GII+.
This is an ideal opportunity for someone who wants direct involvement in the software activities associated with a large scale real-time system.
For further details please quote CW150.

TECHNICAL WRITERS — HERTFORDSHIRE — SALARY UP TO £5,500

Does your forte lie within the production of technical specifications and software manuals? If so, or even if you have two years' solid experience in a technical area, our client would like to meet you and perhaps offer you a more promising career.

Firstly, there are one or two qualifying factors. The Organisation concerned is a manufacturer of intelligent terminals and computer peripherals who strongly believes that its biggest asset is the employee. This healthy working environment enables them to produce one of the finest products around, which gives you a rare opportunity for career progression with exceptional security.

Our client asks for people with the right personality to tackle and solve all manner of problems in close association with the software design and product test teams, and with the enthusiasm to maintain a high standard of documentation at every stage of their development projects. For further details please quote CW151.

Edmund Howard & Partners
Computer Personnel Consultants
5 Brighton Road, Surbiton, Surrey. Telephone 01-399 9185
38 Grafton Street, Dublin. Telephone 778 750

HADRIAN COMPUTER SERVICES LTD.

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CONSULTANTS, ANALYSTS AND PROGRAMMERS

Our application software division needs staff of all levels with a good commercial background and a sound knowledge of RPG II and/or COBOL and/or BASIC experience with MINIS. 2903, System 3, System 32, P410, P300 would be an advantage.
The challenge associated with supporting new users, and dealing with a wide range of systems should appeal to applicants.
Salaries are negotiable, we provide a company car, and a good working environment.
This is an opportunity to join an expanding division of a successful public company, at our Newcastle head office, or in Nottingham. Write fully to

J. O Weightman
HADRIAN (SOFTWARE) LTD.
Northumbria House, Samson Close, Killingworth,
Newcastle-upon-Tyne

ANALYST PROGRAMMER

AP2/4 £3,021 - £4,194 Inclusive plus July 1977 National Pay Award.

Applications are invited from persons with at least two years' programming experience together with some system analysis work.
The duties of the post will include analysing and designing systems and computer programming in R.P.G. II. The Council currently uses an I.C.L. 2903 computer.
The Computer Section is located in Dartford within easy reach of A2/M2 and Dartford British Railway Station (35 minutes London Bridge).
A generous disturbance and relocation scheme is in operation.
Further details and application form, returnable by 22nd August, are available from Personnel Section, Manor House, Swanscombe, Kent DA10 0BS. Tel. Greenhithe 842431, Ext. 27.

DARTFORD Borough Council

BECOME A TECHNICAL JOURNALIST ON COMPUTER WEEKLY

We are looking for writers to join the successful and experienced team on Computer Weekly.

Essential qualities are proven computer experience or a qualification in computer-related studies, plus the ability to write quickly, accurately and clearly to meet strict deadlines.

People with operations experience and/or an in-depth software background will be given priority for the current vacancies. However, if your experience falls outside these areas; and you are interested in joining the team, why not contact us?

Writing for Computer Weekly is a job that opens up interesting new career possibilities for DP people. If you think you can meet our standards contact Malcolm Peltu, Editor, Computer Weekly, Dorset House, Stamford Street, London SE1 9LU, giving brief biographical details.

A MANAGEMENT APPOINTMENT

SYSTEMS PROGRAMMING MANAGER SALARY TO £7,500 P.A.

A leading manufacturing based company situated in Worcestershire is seeking the skills of an experienced Senior Systems Programmer to join a team of specialists as a Manager. The team is currently supporting 2 x ICL 1900 processors, having a large network of terminals throughout the UK.

The company have ambitious development plans including an anticipated 2900 series conversion within the next 12 months.

Candidates should have:
- ★ worked in an ICL environment having in-depth knowledge of the GEORGE III operating system.
- ★ the ability to supervise and manage staff
- ★ good experience of either COMMUNICATIONS MANAGER or DRIVER
- ★ a degree level education and be aged between 25 and 35.

The successful candidate will be given excellent working conditions, experience of the very latest computing techniques including 2900 series training and if necessary, relocation expenses to an attractive housing area.

CONTACT: CATHY TRACEY 021-236 3781 REF. NO. 77/088

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Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR

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Freepost 6, 102, Blandford Street, London W1E 1JZ

Computing Services Association

SCR

Programming Lecturer

A well-established computer systems manufacturing company, located in Crawley, Sussex, requires a programming lecturer to supplement their current lecturing team.

Previous lecturing experience is desirable but applicants with a minimum of two years' programming in high level languages should not be deterred from applying. If no previous experience of instructing, training will be given.

The successful candidate will be expected to take over the running of some current customer training courses and to assist in the development of new training programmes as required.

Apply to: REDIFON COMPUTERS LTD., P.O. Box 2, Manor Royal, Crawley, Sussex. Telephone Marion Barnes, Crawley (0293) 31211, Ext. 278.

World leaders in data entry

REDIFON COMPUTERS LIMITED

Systems Analyst/Programmer

£2,529-£4,095 plus £312 supplement plus Stage II supplement

The above post is in the Computer Division. The successful applicant will be appointed on a contract of two years' duration. The duties of the post are concerned with the design and implementation of Police command and control procedures using a Honeywell Level 6 configuration. Applicants should have a minimum of 2 years' experience of systems analysis, 1 year Cobol or Coral 66. Application forms from the Personnel Officer, County Hall, Bedford. Telephone (0234) 63222, ext. 100. Closing date 25th August, 1977

BEDFORDSHIRE COUNTY COUNCIL

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WINGS APPEAL

During September

SYSTEMS ANALYSTS AND PROGRAMMERS

HAYWARDS HEATH, SUSSEX

SALARY TO £6,000

Computer Data Process Ltd. is the computing division of IPC, the world's largest printers and publishers.

We now require staff, based at Haywards Heath, to develop various projects for the Divisions of IPC including V.D.U. and time sharing systems.

The Company offers an excellent salary structure, annual reviews based on performance, 4 weeks' holiday after 1 years' service and a 32½-hour working week.

Applications are sought from candidates with experience in a main-frame environment but consideration will also be given to recent graduates in Computer Science.

ipc

Applications to: Norman Bacon
C.D.P. Divisional Services
80 Fetter Lane
London, EC4A 1EE
01-405 8282

SUMMER SNAPS!

Systems Consultants £6,000-£9,500

CENTRAL LONDON

Seven large well-established consultancies wish to recruit systems people with all-round experience on third generation equipment and the right personality to deal with clients who require a first rate service. Technical communications consultants are also required where in-depth implementation experience of IBM or ICL T/P message switching networks etc., are essential. Excellent fringe benefits and prospects
CW 31/1 Michael

Junior Programmers £2,500-£3,750

LONDON, HOME COUNTIES

Only one year's experience? Then you are in great demand. We have a large selection of first-rate companies who need people like you
CW 31/2 Annette

Operators to Shift Leaders £2,000-£4,000 (incl.)

LONDON & HOME COUNTIES

We have many vacancies covering all types of machines and locations. Some firms will retrain from one manufacturer to another. Remember these positions are for shift working only. Hurry whilst stocks last.
CW 31/3 Annette

Contract Programmers to £190 p.w.

U.K.

Immediate requirements for IBM COBOL under DOS or OS for L. London. PL/1, OS or CICS. PDP 11 or good IMS for various locations for 3 months plus. Also IBM vacancies in GERMANY, FRANCE, BELGIUM & HOLLAND. Ask for the Contracts Officer on 01-995 2236
CW 31/4 Michael

Successful Salesmen to £12K quota earnings

U.K.

We now have ten different firms for both hardware and systems only companies who are anxious to meet successful salesmen in this industry. They must have previous relevant small systems experience (some VIII's will be considered). All firms have bonus schemes and cars or car allowance. Most positions in S.E. England, but 2 in Midlands
CW 31/5 Michael

Mini Computer Programmers to £5,950

U.K.

Your experience is required now. A very large number of vacancies are registered where a knowledge of Assembler or communications experience is essential (VRC programmers would also be considered). Opportunities exist in S.W., N.W. or W. London, Surrey, Herts. and Manchester in this exciting and rewarding field. There has also been registered some overseas posts to people with 5 or more years in mini computers.
CW 31/6 Michael

Time Sharing Programmers to £6,000

C. LONDON

If you have had time sharing experience involving the use of FORTRAN, BASIC or ASSEMBLER, then we have four nationally known companies who would offer you an exciting job in pre- or post sales support. Some offer generous bonus schemes
CW 31/7 Michael

UCA

DATA EXPRESS HOUSE
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CHISWICK W4 3BR
Recruitment Consultants

01-995 3883 or
01-958 6138 evenings

University of Wales

UWIST

DEPARTMENT OF COMPUTING

PROGRAMMING ADVISER

To help provide a Programming Advisory Service to staff and students in UWIST and to assist with the general running of the computer service.

Applicants should have a degree and be conversant with the university environment. They must have experience in FORTRAN, ALGOL or COBOL.

Salary: £2904-£4811

Requests (quoting Ref. CW) for details and application form to Personnel Section (Academic), UWIST, Cardiff CF1 3NU

Closing date:
26 August, 1977

HOWARD

BELGIUM £16,000 PER ANNUM

PACKET SWITCHING SYSTEM DESIGNERS

required for product implementation utilising newly developed telecommunications hardware. The successful candidates for these key positions will
- Probably be in their early 30's, educated to degree standard and will have a career background which includes substantial mini-computer experience. Assembler and high-level language programming, systems analysis and design on mini-computer equipment in a real time telecommunication environment.
- Be responsible for the detailed design of the sub-projects assigned to them and the provision of all programme specifications and instructions for the members of that project team
- Be self motivated enjoying the prospects of working in charge of a small team with major project responsibilities

Ref: DCD/01107/7

F. RYAN, OVERSEAS RECRUITMENT CONSULTANT
HOWARD ORGANISATION INTERNATIONAL LTD.
MANOR WAY, BOREHAMWOOD, HERTS TEL: 01-953 4066

Analyst/Programmer Circa £4000

A vacancy exists at our Ware site for an experienced person to become part of a small development team and assist in the development of a number of on-line projects.

The successful candidate will be expected to write programmes to meet the requirements of proposed systems in accordance with our Computer System Development standards.

Applicants should possess good systems experience and be conversant with at least one high level programming language, knowledge of a low level language would be an added advantage.

The Company offers excellent conditions of employment including fringe benefits such as pension scheme, canteen facilities and membership of a lively sports and social club.

Please ring or write for an application form to:

Mrs. N. M. Moore, Senior Personnel Officer
Allen & Hanburys Ltd.
Ware, Herts. SG12 0DJ
Tel: Ware 3232 or Hertford 54507

Allen & Hanburys Limited

Programmer to become Programmer/Analyst

INTERNATIONAL BANK

Location: London
Salary: negotiable from £4,000
Plus normal banking fringe benefits

Our client is a growing International Bank who now need to recruit a Programmer/Analyst to work in their "System 3 environment." They would like to meet someone who at the moment, is working as a Programmer, and who wants to move into the Analyst/Programmer area, and who has a good RPG II background. The computer work within the Bank is expanding and therefore, the contribution this person can make could well be significant to the future computer development. The qualifications required for this position are to have a good RPG II programming background and a knowledge of CCP would be useful but not essential.

If you are interested, please telephone John Goldsmith to discuss the position. The salary is negotiable and the fringe benefits are excellent. Please contact John Goldsmith quoting reference no. 684.

Computing Services Association

John Goldsmith (Computer Recruitment) Limited
15 Buckingham Palace Road, London SW1. Telephone 01-828 5356. 24-hour answering service

JOHN GOLDSMITH (Computer Recruitment) Ltd.

JG

datascene

MINI SPECIALISTS
£3000-£5750
CENTRAL LONDON

Our client, a Europe based Software house, requires Mini Programmers. If you have been involved with technical or commercial applications and have experience in any of the following, we want to hear from you.

MINI ASSEMBLER	NIXDORF
MACRO 11	PDP 8
BASIC + RSTS	PDP 11
NOVA/ASSEMBLER	CORAL/66

These positions offer extensive career potential in a rapidly expanding organisation.

FOR FURTHER DETAILS CONTACT US NOW.

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Shift Leaders/Operators Junior Operators
ALL OPERATORS

Junior and Senior Operators with experience on IBM, UNIVAC, HONEYWELL, BURROUGHS, NCR, ICL, GEC & PDP required urgently. Listed below are a selection of our vacancies. If you don't see one to suit you, don't worry. Give us a ring and see what else we've got!

IBM	DOS	1 yr.	C. London	£8600
IBM	DOS	3 yr.	S. London	£3800
IBM	DOS	1 yr.	S. London	£3400
IBM	DOS	1 yr.	W. London	£3600
IBM	DOS	1 yr.	Essex	£3300
IBM	DOS	1 yr.	City	£3000
ICL	G II	1 yr.	Sussex	£4000
ICL	G II	1½ yr.	City	£3700
ICL	G III	1 yr.	Surrey	£3800
BURROUGHS	MCPV	2 yr.	City	£4000
BURROUGHS	MCP	6 months	C. London	£3400
UNIVAC	OS4	3 yr.	W. London	£4600
UNIVAC	ANY	1 yr.	W. London	£3780
PDP	ANY	6 months+	C. London	£3300
GEC	ANY	6 months	C. London	£3400
HONEYWELL	OS2000	1 yrs.	C. London	£3800

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£4000 to £7000

A large international Oil Company, with an expanding online IBM 370/145 system, urgently require several Programmers and Analyst/Programmers.

You'll be working in a stimulating environment where personality matters almost as much as ability.

Mind you, ability is important. You'll need at least 18 months' COBOL or PL1 programming experience, with either an IBM or ICL background. Data Base experience would be handy, but it's not essential.

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We have outstanding opportunities for Fortran Programmers, with a background in any of the following:

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GRAPHICS	PETROCHEMICALS
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SOFTWARE PROGRAMMERS
SYSTEMS ANALYSTS
£4500

We've got some really outstanding opportunities in London and the Home Counties, on Minis including PDP 11/8 and Data General; and Mainframe including IBM (OS/DS), Burroughs, Honeywell and many others.

Salary? The sky's the limit for the right people.

We've listed just a few of our vacancies below. If you see one to suit you, or even if you don't, we want to hear from you TODAY!

Software House	Data General	Assembler	City	£5500
Printing/Publishing	PDP 11/35	RSTS/E	S.E. London	£5500
Software House	PDP 11	RSTS	C. London	to £5000
Travel	IBM 370/155	Assembler	NW1	£6000
Manufacturer	Honeywell	Assembler	W1	Open
Aviation	ICL 1904	N/A	Surrey	£5000
Retailers	Burroughs	Cobol	Herts	£5000++

PLEASE RING US FOR INFORMATION ON JOB OPPORTUNITIES IN YOUR AREA.

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SMALL BUSINESS MACHINES
RPG II/NEAT 3 PEOPLE
£3500-£5500

We have a very wide range of vacancies for Programmers and Analysts with at least two years' experience of RPG II or NCR/NEAT 3. Installations include NCR; IBM System 3, 370 and model 32; ICL 2903; Honeywell, Burroughs and many, many others.

Clients are just as varied, including Banks, Insurance, Retailers and Consultancies.

Listed below are just some of our vacancies. If you find one that suits you — or even if you don't — we want to hear from you NOW!

RPG II	Service Bureau	SYS3/10	W1	c £4000
RPG II	Insurance Co.	SYS3/15	NW	£4200
RPG II	Bank	SYS3/15	City	£4400-£5200
RPG II	Manufacturers	ICL 2903	Middx	£3500-£3800
NEAT 3	Financial	NCR	W1	£4000
NEAT 3	Electronics	NCR	N14	to £4250
NEAT 3	Service Bureau	NCR	City	to £4500

FOR FURTHER DETAILS CONTACT US NOW.

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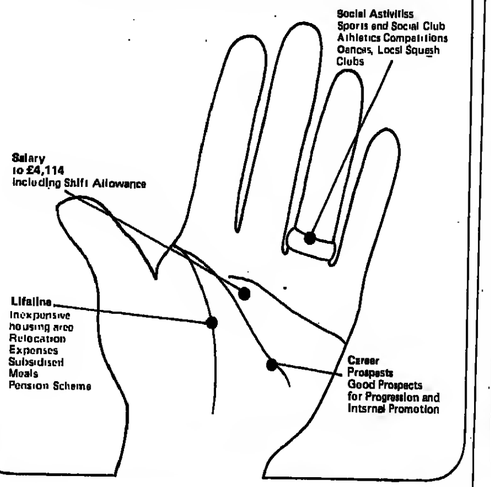
Your Career in Computer Operating

We need additional operators for our Univac 1106 at Halifax and ICL 1900's at Bradford. If you have a minimum of 12 months operating experience on any hardware then ring or send brief details to Tina Black at:-

Provident Management Services Limited

Colonnade, Sunbridge Road, Bradford, West Yorkshire, BD1 2LO
Telephone Bradford 33321 Ext. 231



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- To serve 1,000 Engineers, Scientists, Planners, Surveyors and Administrative staff at 50 remote sites.
- To allow these remote users to make direct use of applications software via a naive computer-user interface.
- To provide users with access to the Authority's Database.

Three posts, based at Huntingdon, are available for graduate calibre staff:

PROJECT LEADER - APPLICATION SOFTWARE DESIGN AND IMPLEMENTATION TEAM (Ref. RP30) c **£6,600**
*Experienced Chief Programmer to lead a small team.
*Knowledge of COBOL, FORTRAN, and an assembler language.

SENIOR SYSTEMS ANALYST (Ref. RP21) c **£6,000**
*5 years experience
*Proven analysis background.

SENIOR SOFTWARE DESIGNER (Ref. RP22) c **£5,300**
*5 years experience of design and implementation of systems written in COBOL.

All posts will provide the opportunity to gain experience in the analysis design and implementation of sophisticated applications using Telecommunications, Database and Transaction Processing software.

Generous relocation expenses are payable in appropriate cases. Application forms (returnable by 28th August) are obtainable from the address below or by telephoning (0480) 56181 – Ext. 252.

PERSONNEL DEPT, ANGLIAN WATER AUTHORITY,
DIPLOMA HOUSE, GRAMMAR SCHOOL WALK,
HUNTINGDON, CAMBS PE18 6NZ.

Bayer UK Ltd. is part of the international Bayer Group marketing a wide range of products in the industrial, medical, agricultural and consumer fields.

The Computer Department is based at the Company's headquarters in Richmond, and provides data processing service for all divisions in the UK and is involved in the development of systems in all business areas. This Department now needs

Systems Analyst

with sufficient experience and maturity to join an established team and act as project leader in the development and implementation of systems.

The successful applicant should have a good basic education with formal training in systems analysis and design together with a minimum of three years' commercial systems experience, including Remote Job Entry and Teleprocessing. A knowledge of programming and experience gained on IBM equipment would be an advantage.

Some travel within the UK will be entailed.

Senior Computer Operator

reporting to the Operations Manager. The successful candidate should be at least 28 years of age, have a good education including 'A' levels and a minimum of three years' experience on IBM360/370 equipment. Additionally, familiarity with IBM MOS/VS, POWER/VS and TP software would be a considerable advantage. The position offers excellent scope for those with the ability to supervise others. At present only one shift is worked but occasional overtime is required.

In both cases, salary will be commensurate with experience and qualifications. Bayer offer the benefits and opportunities usually associated with a successful and fast-moving international organisation.

Interviews will be held at Richmond. Please write or telephone for an application form to the address below

Personnel Department,
Bayer UK Limited,
Bayer House, Richmond,
Surrey TW9 1EJ
Telephone 01-940 6077

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PAYROLL SYSTEMS SUPERVISOR — SALARY c£5,250 P.A.

A national manufacturing concern is presently involved in the implementation of a recognised Package to standardise payroll procedures. They are currently undertaking some of the most sophisticated systems development within the UK, utilising both large IBM 370 series mainframes and mini hardware.
Our client is seeking a Systems Supervisor within the Central Payroll Section to become the focus for other payroll sections in the UK, and with responsibility for analysts and programmers within the unit.
Interested applicants should have:

ESSENTIALLY

* around five years' systems analysis experience — some of this time to have been spent on payroll applications.
* man and project management skills in payroll and related areas in a manufacturing environment.
* degree or equivalent qualification

PREFERABLY

* detailed knowledge of UNIPAY
* programming knowledge

This is an excellent opening for an ambitious Payroll Professional to become involved in a position of interest and responsibility within an expanding sector.
Excellent fringe benefits include a company car schema and recently updated Pension Scheme.
CONTACT: DALE HADLEY 021-236 3781 REF. NO. 77/08/7

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MANCHESTER 061-833 0676 FREEPOST
Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD
LONDON 01-935 0671 FREEPOST 6
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Computing Services Association

SCR

AN OPPORTUNITY TO EXERCISE YOUR PROGRAMMING SKILLS IN A PRACTICAL ENVIRONMENT

This client is a UK major in fast moving consumer products. Marketing techniques are well developed and rely heavily on a sophisticated computer installation.
A Programmer is required to join the Sales Planning Department as Systems Planning Executive. He/she will use interactive facilities to design and develop systems for forecasting and analysis. He/she will be supported by a large 370 running CMS, using PL/1 and some APL, and with a commitment to go MVS and TSO later this year.

UP TO £5K

will be paid to the right candidate who, ideally, will be a numerate graduate with two years' programming experience.
He/she should be keen to have involvement with the main operating functions of the company (sales and production) and to see data processing being put to practical use at first hand.

LOCATION: WEST LONDON RW 32/1

hutchinson-scoggins recruitment
10 Dover Street London W1X 3PH Telephone 01-499 4501

Technical Author

A well established computer systems manufacturing company, located in Crawley, Sussex, requires an experienced technical author capable of preparing hardware manuals.
The job demands original writing from engineering drawings of digital systems.

The candidate (male or female) should possess an H.N.C. in electronics or have equivalent knowledge.

Attractive salary plus removal expenses for the right person.

Apply to Redifon Computers Ltd.,
PO Box 2, Manor Royal, Crawley, Sussex.

Telephone Manor Barnes, Crawley (0293) 31211 ext 278.

World leaders in data entry

REDIFON COMPUTERS LIMITED

UNIVERSITY OF NEWCASTLE-UPON-TYNE

RESEARCH ASSOCIATE: COMPUTING

Applications are invited for the above post in the Centre for Urban and Regional Development Studies, to work on an SSRC funded study concerned with defining functional urban areas for the 1981 Census. The successful applicant will be concerned with the implementation of a national census data base on the University's IBM 370/168 and with the development of data aggregation algorithms.
Applicants should have experience of, or research interests in, the organisation and manipulation of large data bases as well as being a competent programmer in one or more high level languages.
The post is funded for 2 years commencing October, 1977.
Starting salary will be in the range £3,440-£3,888 according to age, qualifications and experience.

Further particulars can be obtained from Professor J. B. Goddard, Department of Geography, University of Newcastle-upon-Tyne NE1 7RU, to whom letters of application (3 copies) quoting the names of two referees should be sent to arrive not later than 31st August.

CITY OF BIRMINGHAM POLYTECHNIC

We offer opportunities for men or women in the COMPUTER CENTRE which operates an ICL 1902A (32k) for a

SENIOR PROGRAMMER

Grade AP.4. £3368-£3702 + £312 + 5% supplements

A working knowledge of at least two languages and experience of Educational Computing would be an advantage.

PROGRAMMER

Special Scale £2853-£3009 + £312 + 5% supplements

Twelve months' experience of either Cobol, Fortran or Plan is required plus an understanding of George Operating Systems.
Further details and application form (to be returned by 25th August, 1977) from the Personnel Officer, City of Birmingham Polytechnic, P. Blank, Perry Bar, Birmingham B42 2SU. Telephone No. 021-356 6911 ext 217.

Review Analyst for International Bank

Morgan Guaranty, one of America's leading banks is seeking a review analyst to work in its new administrative headquarters in Stratford, E15.

The position involves working at project leader level on the quality assurance team in the growing computer department which is currently working on a major automation project.

The resulting integrated systems, which will be implemented in phases over the next few years, cover all aspects of banking activity including Loans, Deposits, Foreign Exchange and Securities, and incorporate an on line data entry and dealers enquiry system with many terminals.

The successful applicant will be an experienced analyst with particular knowledge of banking or financial systems, user liaison, inspection techniques and systems reliability techniques.

He or she will play a monitoring role in all stages of systems development. Thus a realistic approach plus the ability to communicate will be valued.

The Bank pays particular attention to career development and provides both in-house and external training facilities.

An attractive salary will be paid reflecting the importance of this post. In addition, there are excellent fringe benefits which include an annual bonus, low-cost mortgages, non-contributory pension and life assurance and a staff restaurant.

Please write, giving details of career to date or telephone for an application form to Mr. R. Bintham, Morgan Guaranty Trust Company of New York, Morgan House, Stratford Centre, Stratford, London E15 1XB. Telephone 01-555 3111.

Morgan Guaranty
Trust Company of New York

McDERMOTT SCOTLAND

SYSTEMS ANALYST

McDermott Scotland operate a Fabrication Yard on the Moray Firth near Invernass.

The Company have an IBM 37D/126 computer used for Financial Accounting and Production Control systems. Due to further expansion we require a Systems Analyst who will play a key role in the continual development of the installation.

Supervisory experience is essential — a knowledge of IBM hardware and software desirable.

Preference will be given to applicants with 2/3 years' systems experience and a sound appreciation of Engineering and Financial systems.

The Terms and Conditions of Employment are attractive and include a contributory Pension Plan and assistance with relocation expenses will be given where appropriate.

For further details and an application form, please write or telephone:

Personnel Department
McDermott Scotland
PO Box No 5
INVERNESS
IV1 1UP
Tel: Ardersier 2561, ext. 465

Systems Analysts

Surrey

Brooke Bond Oxo Limited are embarking on an extensive, planned development programme to investigate, design and implement our next generation of computer systems in the Sales Support, Distribution, Purchasing, Production, Inventory Control, Financial Control and Personnel areas.

These will be terminal-based systems with distributed intelligence, built around a communications network linked to our twin IBM 370 host configuration.

Advanced Database and Data Communications design techniques will be required to build the planned systems.

Applications are invited from Systems Analysts with at least two years' experience who feel they can contribute to the developments planned.

Based at Welton-on-Thames in pleasant local surroundings, the positions offer the opportunity to join a project teams working flexi-time. Other conditions of employment are those of a progressive Company and salary is negotiable commensurate with experience.

Applications, stating age, experience and salary required, should be addressed to:

Mrs. V. C. Fairhurst
Personnel Manager Administration
Brooke Bond Oxo Limited
Leon House, High Street
Croydon CR9 1JQ

BROOKE BOND OXO LIMITED

SENIOR APPOINTMENTS

MIDLANDS

SALES MANAGERS — SENIOR SALES EXECUTIVES

£12K+ (no limit)

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Do you have a proven record of sales success in the commercial market?
Have you sales experience of computer systems, services or bureau?
Are you seeking the opportunity to grow your career and be one of the highest paid members of the industry?
A generous salary, car allowance and above average commission backed by full technical support, demonstration facilities and established user base will enable you to grow your career on the back of your success.
Ring immediately the advising consultant quoting Ref. No. CW 145.

Insight Marketing & Personnel Consultants Ltd.
72-75 Marylebone High Street
London W1M 4AJ
Telephone: 01-486 5644

PROJECT SYSTEMS CONSULTANTS

MAJOR PUBLIC ORGANISATION

Salary c 6K negotiable plus benefits

A major manufacturer is embarking upon a sophisticated research programme into the visibility of future, co-ordinated, advanced systems for a MAJOR Public organisations.
This is an exciting and stimulating project which will appeal to Business and Systems Analysts with a creative approach to the medium and long term needs of major organisations.
Candidates must have at least five years' experience which should include large mainframe systems supporting **on-line** terminals. Although not essential, data base experience would be an added advantage.
This is a unique and challenging opportunity which will offer an exciting and progressive career.
For confidential, initial discussion, please telephone the advising consultant quoting Ref. No. CW 146.

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72-75 Marylebone High Street
London W1M 4AJ
Telephone: 01-486 5644

0010-4787

OS OPERATORS
BASED
SURREY & CAMBRIDGE

A progressive career awaits you at the two main centres of our Client's complex UK network. Based mainly on large 370's, the twin environments involve professional operators in:

★ Teleprocessing Techniques

You require:

★ 18 months' OS experience (knowledge of HASP would be useful)

With planned technical training, career progression will lead towards:—

★ Operations Technical Support
★ Junior Management
★ User Liaison
★ Other main-frame usage

Rewards include up to 22 days holiday, company products discounts, sports and social facilities and a salary commensurate with a major UK Group, heavily committed to Data Processing.

CONTACT: LONDON OFFICE ON 01-935 0671 REF. 77/08/10

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LONDON 01-935 0671 FREEPOST 6
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Computing Services Association

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SYSTEMS ANALYSTS

If you are looking for an opportunity to join a team of top class professionals involved on a wide variety of commercial applications in Edinburgh then you may be the person we wish to recruit.

You will have a University Degree or equivalent professional qualification, together with a minimum of 3 years experience, including programming, plus proven achievement in the investigation, design and implementation of commercial systems.

Commencing salary including supplements will be not less than £4,500

The Division pursues a progressive staff training and development policy. Benefits include a non-contributory pension scheme, 22 days holiday leave, flexible working hours and (where appropriate) House Purchase Facilities.

In the first instance, please write or telephone for an application form to: Mrs. M.C. Pinkerton,
Assistant Staff Controller,
Bank of Scotland,
2 Robertson Avenue, EDINBURGH, EH11 1PZ.
Telephone: 031-337 2488 (Extension 188)

BANK OF SCOTLAND
COMPUTER SERVICES DIVISION

Technical Author with computer experience?
There's a place for you in Paris

We're a major international computer manufacturer based in Paris and are at present looking for additional enthusiastic and ambitious Technical Authors to join our Publication team.

We need people with both sound writing ability and a good relevant technical background and as a wide variety of computer documentation is involved, you should already be a professional writer in the computer industry or, alternatively, have computer experience at analyst/programmer level and be interested in technical authorship.

Salaries are highly competitive and there is an attractive range of benefits of the kind you would associate with a large international company. We will, of course, assist with relocation expenses to Paris.

In the first instance, send your career resume to Position No. BH 1228, Austin Knight Limited, London W1A 1DS.

Applications are forwarded to the client concerned, therefore companies in which you are not interested should be listed in a covering letter to the Position Number Supervisor.

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LONDON AND HOME COUNTIES
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MINI COMPUTERS

Our Clients offer:
1. A major force in the mini computer market.
2. Recognised highly sophisticated hardware.
3. Enviable software support.
4. Dynamic expension plan.
5. Superb career opportunities.
6. Well above average incomes.

They need professionals with at least one of the following:—
1. A proven track record in Mini-Computers.
2. The ability to manage and motivate.
3. Mature and businesslike approach to sales.
4. Drive and ambition to succeed.

Our clients will also consider Salesmen within other sectors of the industry if they are able to demonstrate the ability to assimilate knowledge quickly. The income package will be very attractive and will be negotiated with successful applicants, it is unlikely to be less than £11,000 p.a. This is a unique and genuine opportunity to leap into the sophisticated and lucrative end of the industry in terms of both status and income.

Insight Marketing & Personnel Consultants Ltd.
72-75 Marylebone High Street
London W1M 4AJ
Telephone: 01-486 5644

We could write pages of the benefits regarding this client, but feel that more will be achieved by discussing the situation with the advising consultant immediately.

Please phone quoting Reference No. CW142 NOW.

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MAJOR COMPUTER MANUFACTURER
£5,500 TO £6,500 PER ANNUM

OPPORTUNITIES exist for individuals to join a major computer manufacturer and by your skills, knowledge and ability take the first steps on a CAREER PATH TO SUCCESS.
If you have experience in the following:—
Upgrade 3rd to 4th Generation
Conversion — Systems and Programming
Cobol
Immediate vacancies exist in the West Midlands to join an established team working on a large project for a company who are market leaders in their field.
YOUR SUCCESS over the next 10 months will lead to opportunities to work on other Major Accounts and YOUR PROGRESSION will only be limited by your own ability.
EXCELLENT SALARIES, expenses and all the benefits of a major company are available with the appointment.

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Telephone the Senior Consultant quoting Ref. No. 143.

HEAD OF SOFTWARE
HERTFORDSHIRE — £NEGOTIABLE FROM £7,000 + CAR

This is a job for a software professional with proven managamant ability.

The company, a major international manufacturer, has embarked upon a challenging and exciting programme of applications development for distributed data processing systems.

They are seeking a manager with very broad experience in both operating systems and applications software. Ideal candidates will have gained relevant experience over a number of years with a major manufacturer, user or software house and will be particularly well versed in the environment of small business machines and communications.

This is a unique opportunity to demonstrate your management skills as the head of a large department at the forefront of computer technology. Prospects for promotion are excellent, a realistic salary and company car is offered together with large company benefits.

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72-75 Marylebone High Street
London W1M 4AJ
Telephone: 01-486 5644

Telephone immediately, the advising consultant, or write quoting Ref. No. CW144.

OPERATOR WITH MORE TO OFFER?

If you feel that you are capable of more than just operating then you may be the Operations Assistant we are looking for. As part of a small but rapidly developing department you will immediately be involved in all aspects of the operation of our IBM System 3 Model 8 installation. In addition you will be expected to become rapidly proficient as an active R.P.G.II programmer.

If you are suited to the responsibility and opportunity offered, write giving details of career to date, to: R. J. Vivan, Systems Manager, Londex Ltd., P.O. Box 79, 207 Anerley Road, London SE20 8EW.

Computer Operator

Due to an increase in our computing activity we need an ambitious operator with at least two years' experience of ICL 1900 series (George II) or 2903 (Exec 1) to join our small team of professionals operating a 24K 2903 with FEOS and EOS 30S.

The computer operation is expanding and is expected to move to a 2 shift system later this year with generous allowances.

We offer excellent holiday entitlement, free life assurance, sick benefit and pension scheme, as well as an attractive salary for the right candidate.

Write for an application form to: Personnel Dept., Dexion Ltd., Maylands Avenue, Hemel Hempstead, Herts. or phone Clive Watts on Hemel Hempstead 2261.

DEXION

FREELANCE PROGRAMMERS
IBM
COBOL; PL/1; SAL
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Ring Hitchin (0462) 65122

SW HERTS
Senior Systems Analyst
£5,500 - £6,000

This is an opportunity to join the Management Services Division of a large, successful manufacturing and distribution organisation, and to work to good professional standards in a well-established data processing environment.

Career prospects and job interest are good, due to a challenging schedule of development work and the implementation of further on-line systems. Employment conditions are excellent, and relocation expenses will be met where appropriate. No significant travel is required.

The opening will interest Analysts with

- *several years' sound analysis experience and the competence to design and implement effective business systems*
- *The ability to communicate convincingly*
- *A good educational background — at least "A" level.*

Should your systems analysis experience be less than that interred by the above salary bracket, we would still like to hear from you, as our clients have a further opening at Systems Analysis level, due to a promotion

For an initial, confidential discussion on the career opportunity, please ring us, quoting Ref. 707, or write briefly.

Tel: 01-637 5796

EDP Systems
52-53 Margaret Street
London W1N 7FF

Systems Analysts and Programmers
— this could be the start of something big!

At the Nestlé's Production Unit in Hayes we are in the process of developing a comprehensive new Factory Support system. We are phasing out our present 1901 and replacing it by the use of a 360/50, 370/136 at our Croydon head office linked to Datapoint 2200 mini-computers at production centres.

We're looking for staff to join us at the initial stage to help establish the system and to develop and grow with it.

If you have an interest in Real Time or Teleprocessing and experience in COBOL we would like to discuss the future with you.

The factory is based in Hayes close to the M4 and the attractive benefits include an attractive pension and life assurance scheme, subsidised canteen, staff sales shop selling a wide range of foods and an active sports and social club. Join us now and you'll be joining at a very interesting time so why not give us a call and find out more. Contact David Taylor at the address below:

Nestlé

The Nestlé Co. Ltd.
Nestles Avenue,
Hayes, Middx.
Tel: 01-573 3811

EXCITING CAREER OPPORTUNITIES MERSEYSIDE

We are retained by our client, a major International engineering organisation with an advanced IBM 370 installation, to recruit data processing professionals to assist in the design and implementation of production/financial systems.

SENIOR PROGRAMMERS To £4,300

Programmers with a minimum of 2 years' experience of Assembler and/or COBOL are required. Responsibility includes assisting with systems design, for which training will be given. Rapid development into systems is envisaged for applicants wishing to broaden their experience.

SYSTEMS ANALYST To £4,500

A systems analyst is required with accounting/payroll experience to design and implement a complex integrated payroll, costing and personnel system utilising the latest techniques. Some travel within the UK is envisaged with this post.

PROGRAMMING CONTROLLER To £5,000

Our clients require a data processing professional to control and direct the programming resources of the installation. Responsibilities include: leading by example, troubleshooting and taking an overall interest in systems being developed and hardware requirements. He/she should have gained an in depth knowledge of IBM software/hardware.

Our clients are located in the North Merseyside area within daily travelling distance of the coast. Normal large Company benefits apply to these positions, including an above average pension scheme and relocation expenses where applicable.

CONTACT: DAVID WADE 061-833 0676 REF. 77/08/9

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Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD

LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102, Blandford Street, London W1E 1JZ

Computing Services Association

SCR

Computer Operators

As part of our planned expansion we are shortly installing a second S3/10 and in March 1978 replacing the S3/10's with an S3/15.

To cope with this growth we are increasing our operations staff and invite applications from operators with experience of one or both of the above computers.

Apply in writing giving full details of age, experience and present salary, to Personnel Manager, Lentheric Morny Limited, Vale Road, Camberley, Surrey.

LENTHERIC MORNY

ON-LINE DATA BASE CROYDON

Exceptional Career Opportunities in a progressive IBM Installation

We are moving into the second phase in the development of two major teleprocessing systems, based on an IBM 138 using CICS/VS and DL/I. In addition to the staff recruited as part of our recent campaign, there is now the requirement for the following DP personnel: —

SENIOR PROGRAMMERS
With three years' experience of COBOL and Leadership Potential.

PROGRAMMERS
With two years' experience using COBOL.

COMPUTER SHIFT LEADER
With minimum three years' experience on IBM 360/370 DOS Installation.

COMPUTER OPERATORS
With minimum 18 months' experience on IBM 360/370 DOS Installation.

If you have TP/Database experience so much the better (if not, we will provide training) but primarily we require WELL MOTIVATED PROFESSIONALS to join our enthusiastic teams working on systems which are of prime importance to the Company. Should you not fulfill these requirements, but have some Systems Analysis and/or Assembler experience, we would still be interested. Why not find out more about these openings and what we have to offer. Come along to one of our OPEN EVENINGS at Rothschild House, Whitgift Centre, Croydon (within a short walking distance of both East and West Croydon stations) on Monday 15th or Tuesday 16th August 1977 between 17.30 and 20.30 hours; when you can meet Alex Leonard (Management Services Manager) and his team for an informal discussion about career prospects and employee benefits within the Company.

If you are unable to call in on these dates, please telephone the Personnel Department — Tel: 01-686 5678 — for further details about current vacancies.

Northern Star Insurance Co Ltd
Rothschild House, The Whitgift Centre, Croydon. Tel: 01-686 5678

Sales Executive

Computer Services • c. £9,000 p.a. including Commission

Cara Consulting Limited, a subsidiary of Aer Lingus, is a well established company principally dealing with software products and services. Turnover has trebled in the last four years and the growth has come from both the UK and overseas.

A highly competent and self-motivated successful sales executive is required to join their sales team to promote the company's extensive range of computer equipment and associated services.

Ideal candidates, men or women, will be over 25 with either experience in a computer software business or with one of the major mainframe manufacturers. Alternatively they may have had experience in selling accounting systems.

Starting salary will be up to £6,000 p.a. but given success total earnings with commission should not be less than £9,000 p.a. plus car allowance. Location: Kensington with some travel outside London.

Please write in strict confidence giving brief details of qualifications and experience to David Hanly, PARC, 52 Poland St., London, W.1.

PARC Personnel & Recruitment Consultants
A DIVISION OF AER LINGUS

Reed Executive

The Specialists in Executive and Management Selection

Business Manager

(Computer Systems)) U.K. and Europe c £9,500 +car

Following internal promotion one of the major international companies manufacturing mini-computers requires a new Business Manager. Reporting to the Managing Director, responsibilities will include the marketing function in the U.K. and parts of Europe together with total involvement in the overall operational control. Candidates should be between 32 and 45 and must have a proven record of successful sales management of small-medium disk based business computers. The position requires a D.P. professional and offers considerable potential for career advancement. All normal large company benefits apply including any necessary relocation expenses.

Telephone 021-643 7226 (24 hr service) quoting Ref. 1329/CW. Reed Executive Selection Limited, 6th Floor, The Rotunda, New Street, Birmingham B2 4BP.

The above vacancy is open to both male and female candidates.

London Birmingham Manchester Leeds

COMPUTER PROGRAMMER

required as soon as possible until 31st January, 1978, for research project on back pain. Experience in Fortran, card and tape terminal and use of statistical packages essential. Knowledge of mathematics and statistics an advantage. Salary in range £2,187-£2,818, plus Phase II supplement and £450 London Weighting.

Apply in writing, with curriculum vitae, to the Secretary, Guy's Hospital Medical School, London Bridge, SE1 9RT, quoting Ref. C.M.

COBOL PROGRAMMERS

The ENGINEERING INDUSTRY TRAINING BOARD has immediate vacancies for enthusiastic COBOL programmers to join a progressive Computer team at their WATFORD Office.

The Board's ICL 1902S disc-based system is currently being used for Accounting, Register and General Commercial Applications and future expansion into the communications field is ensured with the installation of two ICL 7500 systems with Video Terminals.

Career prospects are excellent for PROGRAMMERS with a minimum of 9 months' COMMERCIAL experience.

SALARY UP TO £3,787 (Including Supplements)

Conditions of Employment include —
- Paid Overtime as necessary
- 60p per day Luncheon Vouchers
- 23 days' Annual Leave
- Contributory Pension Scheme
- Sports & Social Club facilities
- Relocation expenses as appropriate

Interested?

Why not ring PETER HART, Chief Programmer, at WATFORD 44322, Ext. 31, or write for an application form to:

MRS. D. L. OYFORD
PERSONNEL OFFICER
ENGINEERING INDUSTRY TRAINING BOARD
41 CLARENDON ROAD
WATFORD WD1 1HS

UNIVERSITY COLLEGE LONDON

Part-time Program Adviser

Applications are invited for the above post in the Department of Statistics and Computer Science involving giving advice to students and staff in the use of a variety of computers and programming languages including PL/I, Algol-60 and Fortran on IBM, ICT and PDP systems. Appointment is part-time, preferably term time only, at three fifths of the appropriate point on the scale (£2,804-£4,811 plus £450 London Allowance). Application form and further details may be had from the Personnel Officer, (Technical Staff CL4) University College London, Gower Street, WC1E 6BT

HillPriceDavison

PROGRAMMERS UK & EUROPE

Hill Price Davison is a well-established and expanding Software House now in its fifth year of operation.

During this period we have built up a solid client base and maintain excellent relations with both our clients and our staff.

We now require additional programming staff for a wide variety of projects in the UK and Europe on both Mini and Mainframe Computers.

Programmers required for these assignments should ideally possess 5 years' computing experience but first-class people with less experience would be considered.

In addition to excellent salaries and bonuses successful applicants will be able to broaden their experience with a friendly and professional company.

Please telephone or write to:

Alan Isaacs
HILL PRICE DAVISON LTD.
Walham House, Walham Grove
London SW6 1QP
Telephone: 01-381 3266

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FORTRAN

Programmers urgently required for Industrial and Scientific development.

£3,500-£6,000
ALL AREAS
Phone for free list of vacancies

34, Percy St. London, W.1.
637 5551 day, 495 0468 eve.

FACULTY OF BUSINESS (BARKING PRECINCT)
DEPARTMENT OF SYSTEMS & COMPUTING STUDIES

LECTURER II APPOINTMENT

Applicants for this post should have recent commercial, industrial or teaching experience from among the areas of information systems, database technology and operating systems. Appropriate academic qualifications required and experience of ICL 1900 series would be an advantage.

(Ref S/DE 120)

SALARY SCALE: LECTURER II — £3,279-£5,483
(plus appropriate Government Supplement of up to a maximum of £492 and appropriate London Allowance)

Further details and Application Form from —
The Senior Staffing Officer (2)
North East London Polytechnic
Forest Road, London E17 4JB
Telephone: 01-527 2272 (Extension 20)
Closing date: —12th September, 1977. Please quote reference no.

NELP North East London Polytechnic

SYSTEMS ANALYST

MARCOL BUSINESS MACHINES

An experienced Systems Analyst is required in our PRE-SALES Division, to support our sales team in selling PDP-11 based mini computers.

If you have the following qualifications:

(a) Good knowledge of commercial systems; sales order processing, accounting routines and payroll.

(b) Previous experience installing mini-computer systems.

Location: INITIALLY EAST MIDLANDS.

Please apply to:
David A. Heinl, U.K. Sales Manager
MARCOL BUSINESS MACHINES LTD.
Clarkson House, Clarkson Street
Mansfield, Notts.
Telephone: Mansfield (0623) 35344

MARCOL is an associate company of the Norwich Union.

COMPUTER SERVICE ENGINEER

£5500+

Required by an American based company to work from home, ideally situated in the Manchester, Kidsgrove area. This position would suit a person with minicomputer experience and/or plotter experience, and should be sufficiently capable to command a salary in excess of £5,500 p.a. to start.

Training will be provided at company manufacturing facility located in California, U.S.A.

Please write in the first instance to: Box 1853, Computer Weekly.

SOUTH WESTERN REGIONAL HEALTH AUTHORITY

SYSTEMS ANALYSTS

G.A. £2691-£3534 or S.A. £3534-£4344

according to experience plus Phases I and II pay allowances

(New entrants to the Health Service normally start at minimum of scale)

Applications are invited from qualified Systems Analysts or N.H.S. candidates with wide experience in Finance Departments.

The Computer Department situated at Dove Lane, Newfoundland Road, Bristol, is equipped with a Honeywell 2060 which will be replaced by an ICL 2960 and the region is also installing Data Communications Equipment for a number of projects including Stock Control.

Successful candidates will join teams developing new payroll, manpower and budgetary control systems.

Appropriate training will be given in all aspects of systems and associated projects.

Details and application form from the Regional Personnel Officer, Establishment Section, 28 King Square, Bristol BS2 8HY.

Closing date 2nd September, 1977.

London Borough of Enfield

Applications are invited for the following vacancies in the Borough Treasurer's Department.

Senior Systems Analyst
£5494 to £6055 (Post No. 218)

Applicants for this post should have a sound background in programming and systems analysis and some years' experience in Local Government or Commercial Data Processing.

Senior Systems Analyst
£5494 to £5797 (Post No. 222)

The successful applicant for this post will be responsible for advising and implementing software, in addition to supervising programming standards.

Programmer
£3694-£4072 (Post No. 225)

Applicants should have at least one year's programming experience preferably with ICL COBOL.

The Borough's Computer Installation currently consists of a 64K ICL 1902T and is developing 7502 terminal systems.

Application forms are obtainable upon receipt of a foolscap stamped addressed envelope from the Borough Treasurer, P.O. Box 54, Civic Centre, Silver Street, Enfield, EN1 3XF. The closing date is 19th August, 1977. Reference No. ORA/978 and the post in which you are interested must be quoted in all correspondence.

Leading manufacturer of:
DATA ENTRY SYSTEMS AND COMPUTER PERIPHERALS

with sales and service centres throughout Europe and the U.S.A., offers the following exciting career opportunity.

PRODUCT MANAGER

Responsibilities cover business development through new and enhanced product introductions and guidance to our international sales force.

Applicants should have at least five years' experience of selling small or medium size computers, preferably System-3, and a well-developed flair for producing sales policies, product guides and other marketing support literature — languages and engineering backgrounds would be distinct advantages.

Please send details to:
DECISION DATA, 82 London Road, Staines TW18 4HB

DECISION DATA

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WHATEVER YOUR RATE
WE WILL TOP IT
RING 01-656 4581

Systems Analyst (E.D.P.)

Edmundson Electrical Limited, a member of the Charterhouse Group, is a major force in the distribution and sale of industrial and domestic electrical products within the U.K. employing 900 people at 38 locations and pursuing an active growth policy.

We are now seeking an experienced and energetic Systems Analyst to join the E.D.P. department based at our headquarters in the centre of Knutsford.

The person we are looking for will be aged 25-40, educated to a minimum GCE 'A' level or equivalent and have had 4-5 years computing experience of which a considerable amount should have been in programming or systems, in a responsible role.

Duties will include designing, testing and implementing new and revised systems and instructing users in the scope and use of systems facilities, as well as Systems Support and Maintenance.

The successful male or female applicant will be responsible to the Systems Manager and will receive an attractive salary and conditions of employment.

Existing holiday arrangements will be honoured.

Please write giving brief details or telephone now for an application form to:

S. Clarke, Esq.,
Personnel Executive,
Edmundson Electrical Limited,
P.O. Box 1, KNUTSFORD, Cheshire WA16 6AY.
Telephone: Knutsford 3811.

Edmundson Electrical Ltd.
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We require a competent

ELECTRONIC ENGINEER

to join us as Technical Manager designate. Our product range is: CCTV Cameras and associated equipment. VDUs and Microprocessors.

A sound knowledge of both analogue and digital circuitry together with practical ability is essential. Salary is negotiable up to £3,200 p.a. dependent upon qualifications and experience.

Apply to: Crofton Electronics Ltd., 35 Grosvenor Road, Twickenham, Middlesex TW1 4AD.

THE UNIVERSITY OF BATH

DATA PROCESSING OFFICER

A person with extensive all round computer experience is required to manage the University Administration's Data Processing department. The computer configuration consists of a Burroughs B1726 central processor, tapes, disk, card reader, line printer, mini computer, VDUs, and Badge / Card readers. Financial, student records and Library circulation procedures are currently computerised but there is scope for considerable development work.

The successful candidate will need to demonstrate the ability to effectively communicate with all levels of management, undertake systems design work and project control responsibilities. A sound background of COBOL is essential.

The salary scale is under review but the commencing salary for a suitable candidate will be set in the upper part of the range which is currently £2,904-£5,627.

Applications, quoting the names and addresses of two referees, should be received by the Personnel Officer, University of Bath, Bath BA2 7AY, by 31st August. Reference number 77/88/CW.

Puzzle answer

STRANGELY ENOUGH the ratio π is involved in the solution to this problem. The probability that any given needle will come to rest lying across one of any given set of regularly spaced parallel lines can be determined from the fraction: (2 × needle length) / (π × line space).

In our particular case Length = Space, so Probability is 2/π.